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Plant of the Portsmouth Steel Company

Late Developments in an Ohio River Steel Works—Arrangement and Equipment of Plate Mill, Bar Mill and Jobbing and Sheet Mills

The plant of the Portsmouth Steel Company is located at Portsmouth, Ohio, in what was originally known as the Hanging Rock district, where the first blast furnace west of Pittsburgh was built, and consists of open-hearth steel works, blooming mill, plate mills, sheet and jobbing mills and pickling, galvanizing and corrugating works. The Portsmouth Steel Company is the successor of a small

one 66-in. jobbing mills, five hot sheet mills and three stands of cold rolls, together with pickling, annealing and galvanizing departments. The plant parallels the Ohio River and is on the Southwestern Division of the Baltimore & Ohio and on the Norfolk & Western Railroad.

The open-hearth building is 100 x 528 ft. in plan and contains two charging machines installed by the Wellman-



The Continuous Bar Heating Furnace for the Bar Mill, Showing a Part of the Plate Mill Engine at the Right

business founded in 1871. The original plant was located in the west end of Portsmouth at the junction of the Scioto and Ohio rivers. Owing to the steady growth of the company, it was deemed necessary in 1898 to remove the plant to the eastern part of Portsmouth where more ground was secured, the new location also affording better railroad and shipping facilities. At that time the product consisted of steel bars, plates and small structural shapes, also special five-ply and vault steel plates. The present owners acquired the property in 1901, which then consisted of two acid and one basic open-hearth furnace, one 22-in. blooming mill, one 28 x 60-in. jobbing mill and one 21-in. bar mill. This equipment was not modern and did not meet the purposes of the new company and was early discarded. The entire plant has been rebuilt and enlarged and the latest modern furnaces, mills and other equipment has been added to bring the plant strictly up to date. At present the works of the Portsmouth Steel Company consists of seven 60-ton basic open-hearth furnaces, a 35-in. blooming mill, an 84-in. three-high plate mill, an 18-in. three-high bar mill, one 48-in., one 60-in. and

Seaver-Morgan Company, Cleveland. In the casting bay operating the entire length of the building are two 100-ton ladle cranes equipped with 25-ton auxiliaries. In addition, there is one 10-ton electric traveling crane and, at each of the furnaces, a jib crane has been installed for handling furnace spouts, etc. The cranes were installed by the Alliance Machine Company, Alliance, Ohio. The ingots are stripped by a 125-ton Morgan crane provided with a 10-ton auxiliary. The open-hearth furnaces are all fired with natural gas, but are arranged for the use of producer gas or fuel oil. The gas producer plant, which is installed for emergency use, contains eighteen producers.

All pig and scrap iron used in the open-hearth furnaces is unloaded in the stock storage building by cranes with electric magnets. This building is 65 ft. wide by 322 ft. long, with a 350-ft. open runway having two railroad tracks, one on each side of the structure. The yards are equipped for handling inbound and outbound freight and the transfer of materials from one department to another is made on standard gauge tracks laid with 70-lb. rails. The rolling stock consists of six locomotives varying from



Charging Crane Serving the Slab Heating Furnaces and the Plate Mill Table

20 to 60 tons, twenty-five 40-ton capacity flat and gondola cars and numerous charging box and hot metal cars for handling raw and finished material.

The soaking pit building is 66 x 200 ft. in size and contains three 4-hole soaking pits with hydraulically operated covers. The pits are natural gas fired, but can be arranged for producer gas, if desired. Each of these pits is 7 x 9 ft. The entering table for the blooming mill parallels one end of these pits, making it convenient to handle the ingots.

The blooming mill building is 84 x 480 ft. in plan and is commanded by two cranes of the Morgan type; one of 30 tons capacity with a 10-ton auxiliary, and the other of 15 tons capacity. The reversing engine and the blooming mill were installed by Mackintosh, Hemphill & Co., Pittsburgh. The 35-in. blooming mill has a capacity for breaking down ingots to 4 x 4-in. billets or slabs 1½ x 8 in. The induction drive was furnished by the Wheeling Mold & Foundry Company. The product of the mill is cut by a steam-hydraulic shear, which has a capacity for slabs 10 x 30 in. or billets 17 x 17 in. Space has been reserved for the future installation of another mill.

The plate mill is of the three-high type having 30 x 84-in. rolls driven by a 44 x 60-in. Corliss engine. The plate mill and engine were built by Mackintosh, Hemphill & Co. The slabs are heated in three gas-fired furnaces. The

plate mill building is 90 x 740 ft. in plan, with lean-tos on either side, 37 x 47 ft. wide, respectively.

The tilting tables are hydraulically operated and driven by two small double cylinder reversing engines; while the slabs are still at a red heat they are conveyed from the shears at the blooming mill to the heating furnaces at the plate mill, where they are charged and drawn by an improved type of electric charging and drawing crane furnished by the Alliance Machine Company. Plates as thick as 1¼ in. and varying in width up to 78 in. and in length up to 480 in. are rolled. After the plates leave the mill they are passed through a series of straightening or leveling rolls, then conveyed on a long cooling table having rollers driven by electric motors. At the end of the cooling tables the plates are marked off into the various sizes into which they are to be sheared and stamped with the original heat number for identification. A number of test pieces are cut from

the plates, properly marked and delivered to the laboratory where such physical and chemical tests as are necessary to meet the requirements of the specifications are made.

The shearing department is equipped with cut-off, slitting, circular and several small shears for cutting sketch plates for special requirements. After the plates are cut to the sizes ordered, they are carefully weighed and loaded into cars for shipment, the loading being done by two 10-ton and one 15-ton Morgan electric cranes.

The 18-in. bar mill is of the three-high type and is operated by a 32 x 54-in. Corliss engine installed by the Hooven-Owens-Rentschler Company, Hamilton, Ohio. Billets are unloaded from cars and are delivered by a lifting magnet to the pusher table of the continuous heating furnace, which is of the latest type. The lifting magnet is of the Electric Controller & Mfg. Company manufacture. The furnace is gas fired and is provided with water cooled skids. The mill is provided with an attachment for rolling universal plates, if desired. For emergency purposes ten gas producers are provided. The bar mill, roll and machine shop is 40 x 110 ft.

The tie plate, shearing and shipping building is 60 x 340 ft., and is served by a 10-ton Morgan crane. The mill is fully equipped with mechanically operated entry and run-out tables for handling the product of the mill, which

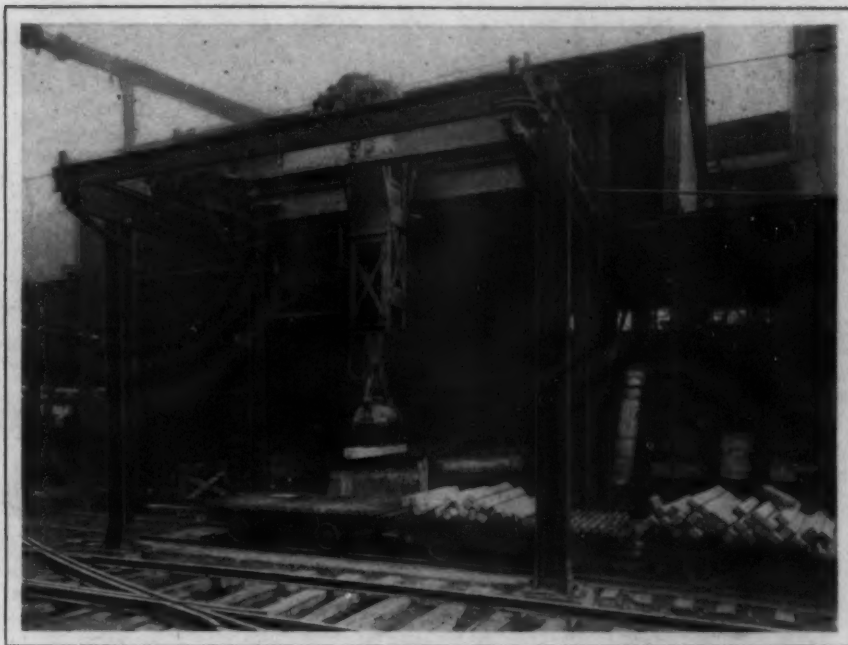


The Slab Heating Furnaces for the Plate Mill; the Approach to the Plate Mill at the Middle Left and the Billet Unloading Yard for the Bar Mill at the Left Background

consists of patented Economy tie plates manufactured exclusively for railroad requirements. The tie platebars are conveyed to a punch and shear department, where in one operation they are cut to length and punched to suit various rail bases, and after inspection are bundled ready for shipment.

The new jobbing and sheet mills department was constructed during 1911. The mills are driven by a 44 x 72-in. Mackintosh-Hemp-hill Corliss engine, geared in the ratio of about 2 to 1 with the mill's which are located on each side of engine. The sheet and jobbing mills were built by the Wheeling Mold & Foundry Company, Wheeling, W. Va. The west train of mills contains one 30 x 60-in. and one 30 x 66-in. jobbing and plate mills, two sheet mills and one cold roll; the roughing stands of the jobbing mills are equipped with electrically operated lifting jacks. The east train of mills contains one 28 x 48-in. jobbing plate mill, three sheet mills and two cold rolls. The product of the jobbing mills, after rolling, is passed through continuous annealing furnaces for blue annealing, and when the sheets are discharged from the annealing furnaces they are passed through straightening or leveling rolls, and then conveyed in long run-out cooling tables to the shears, where they are cut to the specified sizes, inspected and then stored in the warehouse for shipment. The heating furnaces for the jobbing mills are fired with producer gas. On the five sheet mills, sheets varying from No. 12 to No. 30 gauge in widths up to 48 in. are rolled. The sheets are box annealed in specially constructed furnaces and are then carried either to the warehouse for shipment or to the pickling and galvanizing department.

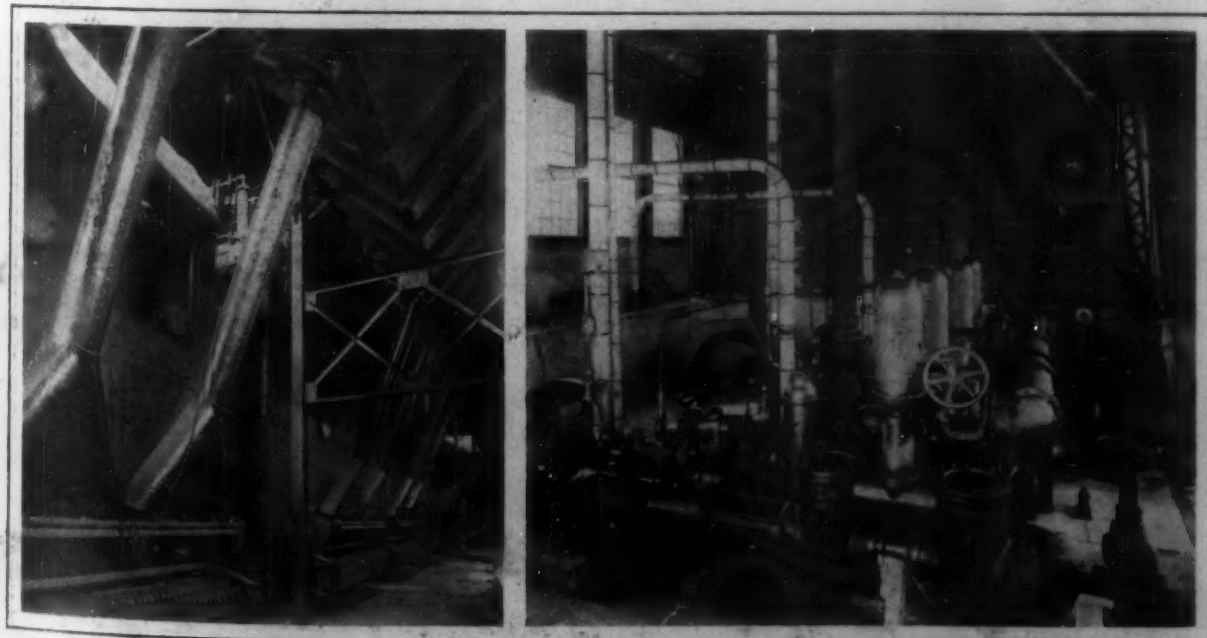
The entire new department is under one roof, and the building, which is of steel construction, is 275 x 490 ft. in plan. The roof is unusual in design, as it is not broken up by valleys. The building is divided practically into four bays. The furnace bay is 80 ft. wide; the hot mill bay 89 ft. wide; the annealing bay, 48 ft. wide, and the warehouse and shipping department, 58 ft. wide. The warehouse and shipping department extends beyond the length of the building a distance of 122 ft., 6 in. The extreme height of the building to the peak of the monitor is 58 ft. All of the cranes in this department were fur-



The Lifting Magnet for Carrying Bars to the Continuous Heating Furnace of the Bar Mill

nished by the Alliance Machine Company. The furnace building is served by a 20-ton crane with a 10-ton auxiliary; the hot mill building, by a 40-ton crane with a 15-ton auxiliary; the warehouse, by two 10-ton cranes, and the pickling and galvanizing department by two 5-ton mono-rail telfers.

The sheet and jobbing mill equipment includes five pair furnaces, five double-sheet furnaces, six double-box annealing furnaces, three slab heating furnaces for the jobbing mills and three double open-annealing furnaces. The pair, sheet, box-annealing and open-annealing furnaces are stoker fired, coal being used for fuel. The slab heating furnaces are producer gas fired. The box-annealing furnaces are 17 x 21 ft.; two of the slab furnaces are 8 ft. 6 in. x 21 ft. and a third is 7 ft. 6 in. x 19 ft. The open-annealing furnaces are 8 x 20 ft. For pickling the sheets four vats are provided with capacity for 54-in. stock. Each vat is served by an electrically driven plunger. From the pickling vats the sheets are delivered by the mono-rail to three water tanks and then to three muriatic acid tanks. In addition to the other equipment in the sheet finishing department are corrugating, crimping and corrugated curving machines. The two cooling tables are, respectively, 350 and 400 ft. long.



Coal Handling and Automatic Stoker-Equipment in the No. 3 Boiler House; View of the Pumping Plant



The Rollers' Side of the 30-in. Sheet Mills

In the galvanizing department are three galvanizing pots with the necessary pickling, washing and drying accessories of special design for making high-grade galvanized sheets. The sheets from this department will be

marketed in flat, corrugated and curved, V crimped and pressed standing seam, etc. There will be but two grades of galvanized sheets manufactured, trade marked "Portsmouth Iron" and "Portsmouth open-hearth steel." Before



The Catchers' Side of the Sheet Mills, Showing the Steam Engine Drive at the Left



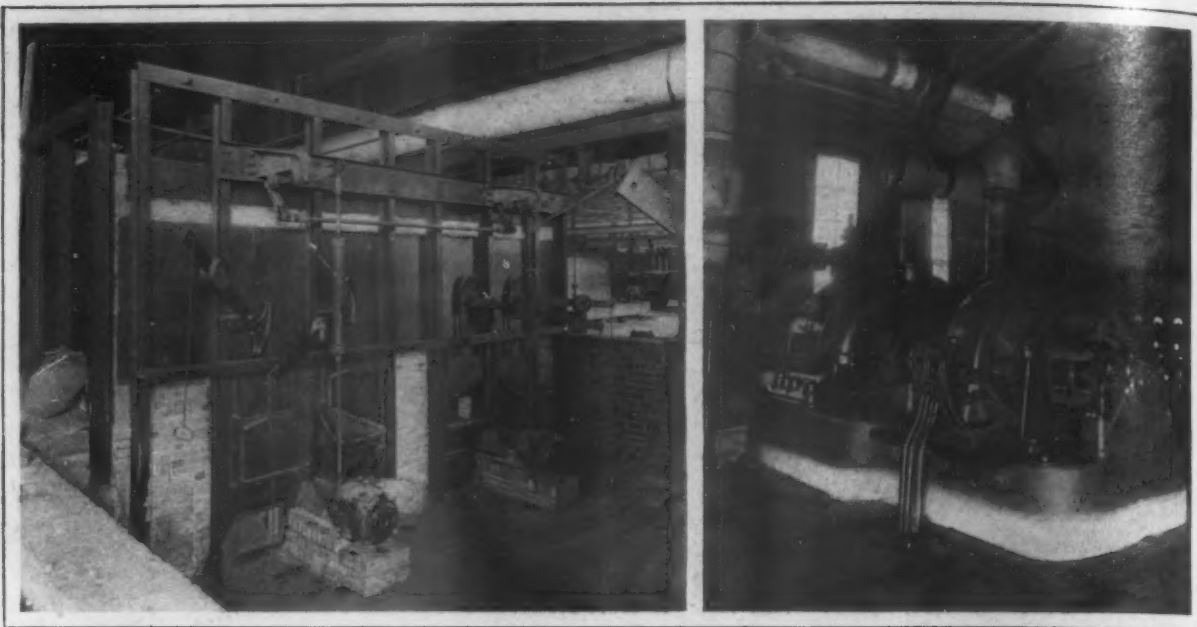
Jobbing Mill Heating Furnaces Showing in Background Parts of the Jobbing Mills

marking and bundling each sheet must pass the scrutiny of an experienced inspector and the defective material be discarded. The department is located on the plant.

A coal and ash handling plant has been installed in the new jobbing and sheet mills department and is arranged for handling and distributing coal to overhead



The Sheet and Pair Heating Furnaces Showing the Automatic Stokers

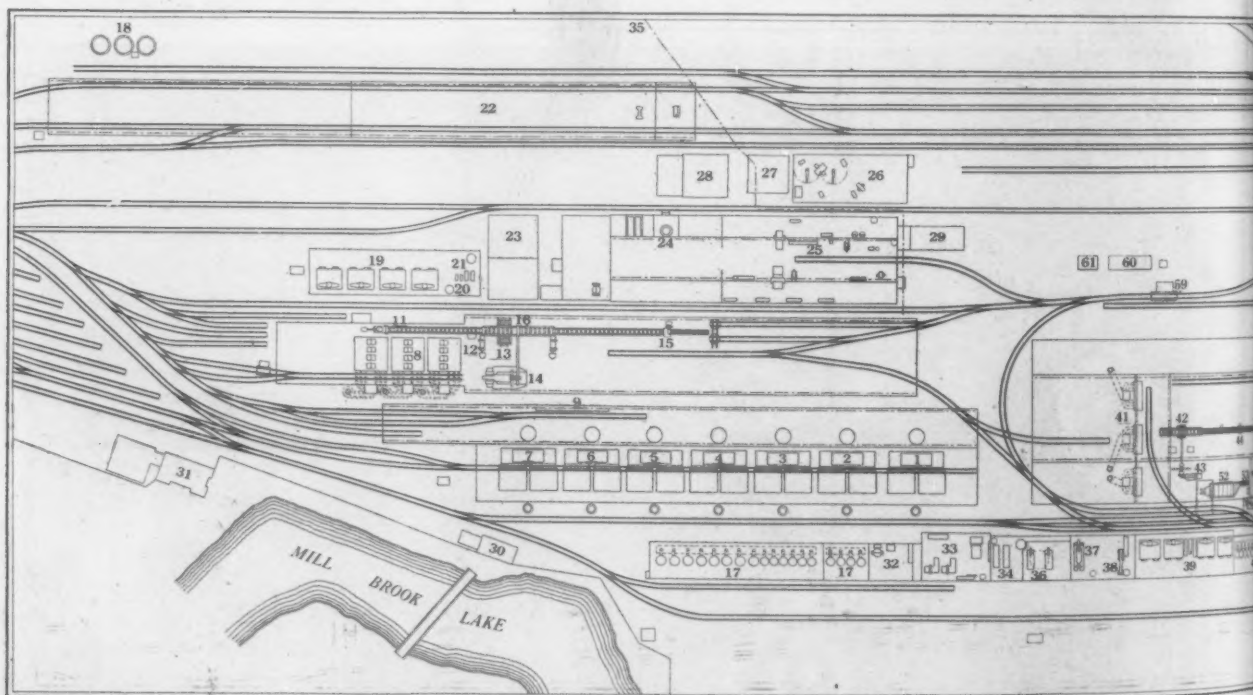


End of Box Annealing Furnaces, Showing Automatic Stokers, Method of Driving the Stokers and in the Distance at the Right the Carriage Containing the Sheets to be Annealed, Cars Loaded with Charging Boxes Filled with Scrap from the Mills and in the Far Background the Front of the Facing Group of Box Annealing Furnaces; in the Illustration at the Right is Shown the Turbo-Generator Set in the Central Power House

bunkers in the boiler house, gas producer house and to a storage bin serving the sheet and pair furnaces and box-annealing furnaces, which are stoker fired, as stated. The ashes from the boiler house, gas producers and furnaces are collected through underground tunnels and elevated in a ship hoist to an elevation over the railroad track. The gas producers are of the latest type, mechanically fired.

The foundries for making steel and gray iron castings are well equipped for making large and small castings for the requirements of the plant. In the store house is carried a large stock of miscellaneous supplies such as are required in the maintenance of machinery and equipment in all departments of the works.

The power for operating is derived from three inde-

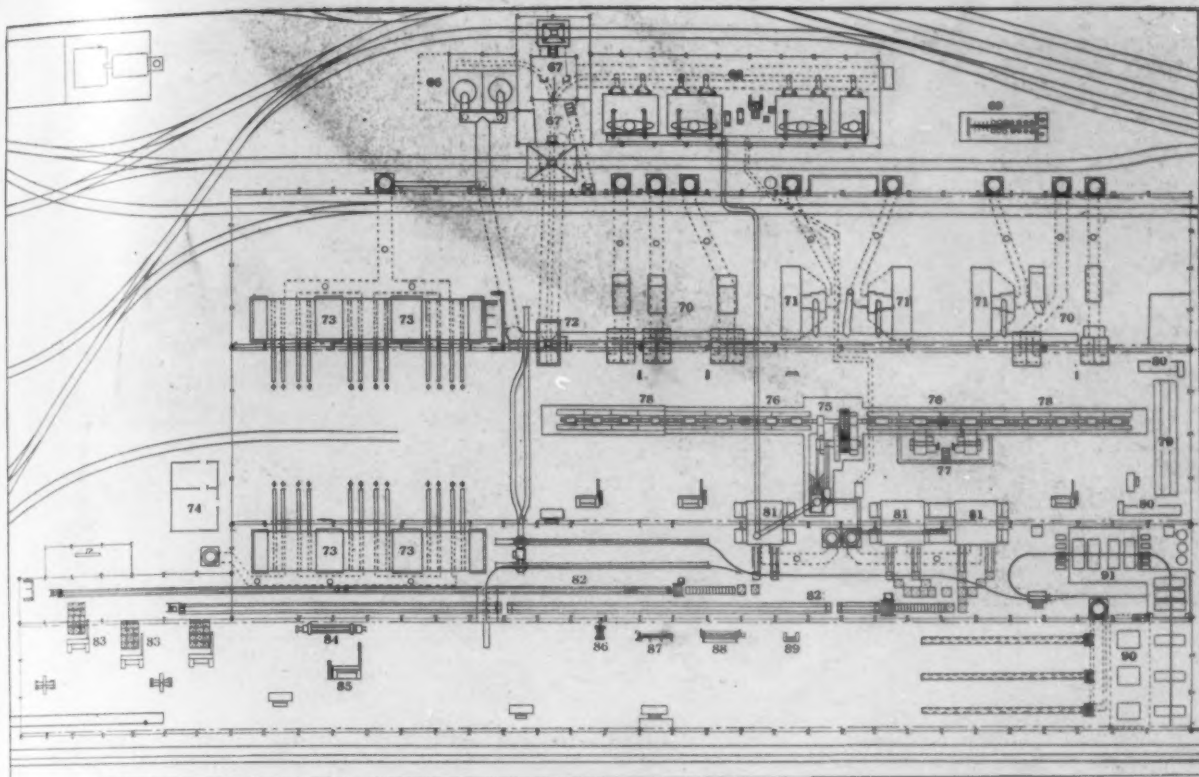


GENERAL PLAN OF THE PLANT OF THE PORTSMOUTH STEEL COMPANY, PORTSMOUTH, N.H.

Nos. 1 to 7—60-ton open-hearth furnaces
No. 8—Three four-hole soaking pits
No. 9—Pouring platform in open-hearth building
No. 10—Bar mill engine, 32 x 54 in.
No. 11—Ingot tilter and entering table for blooming mill
No. 12—Induction drives for reversing tables of blooming mill
No. 13—Manipulator
No. 14—Blooming mill reversing engine
No. 15—Steam-hydraulic slab and billet shear
No. 16—35-in. blooming mill
No. 17—Gas producers for open-hearth furnaces and soaking pits
No. 18—Fuel oil tanks

No. 19—No. 2 boiler house for the blooming mill
No. 20—Feed water pumps
No. 21—Hydraulic pumps and accumulator
No. 22—Stock storage
No. 23—Pattern storage
No. 24—10-ton cupola in gray iron foundry
No. 25—Machine shop
No. 26—Forge shop
No. 27—Oil house
No. 28—Store room
No. 29—Electrical repair shop
No. 30—Physical and chemical laboratory
No. 31—General office
No. 32—Clay grinding mills
No. 33—Central power station
No. 34—Hydraulic pumps

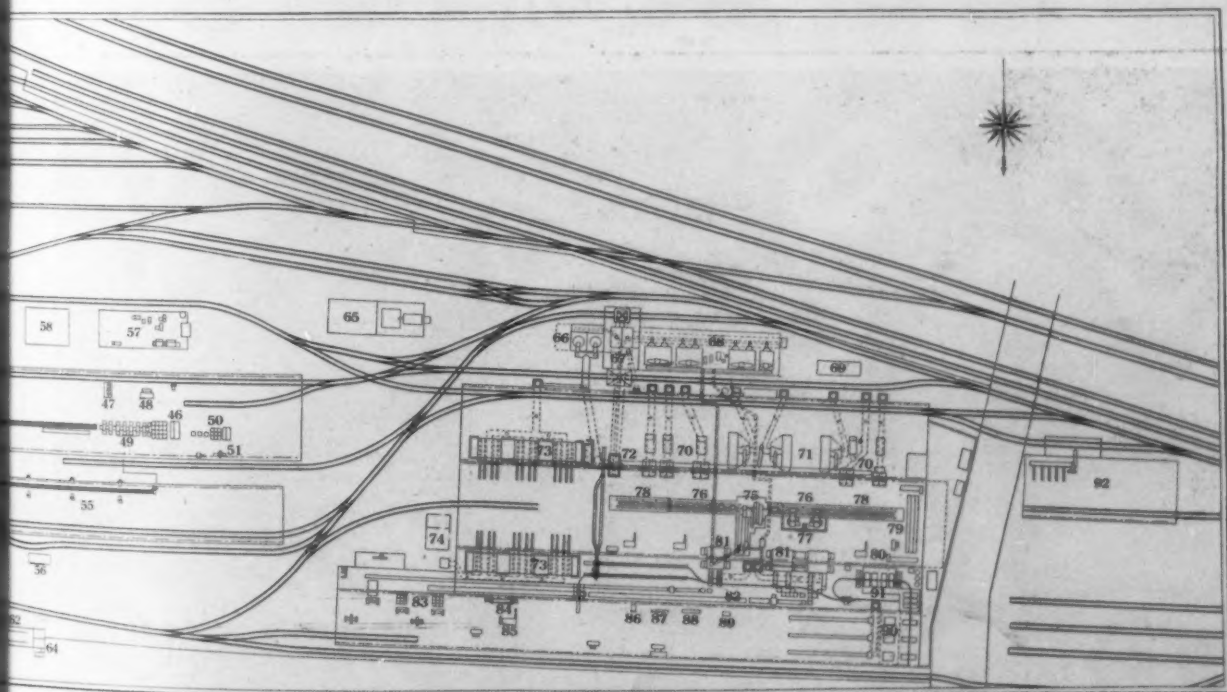
No. 35—Pumping plant
No. 36—Artificial lake
No. 37—Air compressor
No. 38—Emergency lighting unit
No. 39—Plate and bar mill boiler house
No. 40—Gas producers for plate and bar mill furnaces
No. 41—Slab heating furnaces for plate mill
No. 42—Three-high plate mill, 30 x 84 in.
No. 43—Corliss engine, 44 x 60 in.
No. 44—Leveling or straightening rolls
No. 45—Run-out table
No. 46—Electrically driven plate shear, 144 in., for stock up to 1½ in. thick
No. 47—Hydraulic shear
No. 48—Scale
No. 49—Castor bed for plate shears



Plan of the Sheet and Jobbing Mills of the Portsmouth Steel Company

pendent boiler houses of 3000-hp capacity each and one central power station. All boilers are of the Stirling water tube type, equipped with chain grate stokers. The coal is unloaded from the railroad cars into a large re-

ceiving hopper located under the track close to the boiler house; from here it is fed into a crushing plant and then lifted into a large storage bin or distributed into overhead bunkers in front of each boiler. Each boiler house is



SHOWING THE OPEN-HEARTH PLANT, PLATE AND BAR MILLS AND SHEET AND JOBBING MILLS

- No. 50—Plate shear, 120 in.
- No. 51—90-in. circle shear
- No. 52—Continuous billet heating furnace
- No. 53—18-in. three-high mill for shears and tie plates
- No. 54—Hydraulically operated cooling table
- No. 55—Tie plate shearing department
- No. 56—Punch and die tempering department
- No. 57—Tie plate roll and machine shop
- No. 58—Shipping offices
- No. 59—100-ton track scale
- No. 60—Carpenter shop
- No. 61—Tool house
- No. 62—Main entrance for employees
- No. 63—Timekeeper's office
- No. 64—Police headquarters

- No. 65—Grease house
- No. 66—Mechanically fired gas producers
- No. 67—Coal and ash-handling plant
- No. 68—No. 3 boiler house
- No. 69—Toilet
- No. 70—Sheet and pair heating furnaces
- No. 71—Slab heating furnaces for the jobbing mills
- No. 72—Ash-collecting hopper
- No. 73—Box Annealing Furnaces
- No. 74—Sheet and jobbing mill superintendent's office
- No. 75—44 x 72-in. Corliss engine, geared 2 to 1
- No. 76—30-in. jobbing mills
- No. 77—Electrically operated lifting jacks for 60 and 66-in. jobbing mills

- No. 78—Sheet mills
- No. 79—Roll racks
- No. 80—Roll lathes
- No. 81—Double open annealing jobbing mill furnaces
- No. 82—Run-out cooling tables for jobbing mills
- No. 83—156-in. jobbing mill shears
- No. 84—Hydraulically operated stretcher
- No. 85—125-in. re-squaring shear
- No. 86—Curved corrugating machine
- No. 87—V-crimping machine
- No. 88—144-in. corrugating machine
- No. 89—54-in. shear
- No. 90—Galvanizing department
- No. 91—Pickling vats
- No. 92—Sheet bar shearing building



The Runout Side of the Open Annealing Furnaces at the Right Receiving Product of the Jobbing Mill and Discharging on the Sheet Conveyor and Cooling Bed at the Left

provided with automatic regulators for maintaining a constant steam pressure and water level on each boiler.

In the power house are two 250-kw. 250-volt direct-current generators, direct-connected to high-speed side-crank engines; one 500-kw. 250-volt direct-current mixed-flow steam turbine; two large cross-compound two-stage air compressors and two hydraulic pumps which furnish power for the hydraulically operated machinery throughout the plant. The pumps work under a pressure of 600 to 750 lb. per square inch. There is also the necessary auxiliary apparatus for operating the turbines condensing.

Exhaust steam for operating turbines at low pressure is furnished by the engines operating the bar and plate mills. The power house piping is arranged so that during periods when the bar and plate mill engines are shut down the exhaust from the power house pumps, engines, etc., may be utilized to operate the turbine. Sufficient steam is obtained from these units to operate one turbine under full load.

The water supply is taken from the Ohio River, near the bank of which is located a waterproof concrete dry-well, 24 ft. in diameter and 70 ft. deep. The bottom of the well



Another View of the Open Annealing Furnaces, Showing the Leveling Machine and Toward the Left, in the Distance, One Group of the Box Annealing Furnaces



Continuation of the Cooling Tables, Showing the Box Annealing Furnaces and in the Bay at the Left the Warehouse and Shipping Departments, with Shearing, Crimping and Corrugating Machines

is within 10 ft. of the river's low-water mark, and here are located two motor-driven centrifugal pumps, each having a capacity of 1500 cu. ft. per minute. These pumps deliver the water into an artificial lake 60 ft. above the river low-water level. The lake varies in depth from 3 to 30 ft. and covers an area of about 40 acres. From the lake, which is used as a cooling and settling basin, the water is piped to a large gravity well located back of the power house. In the power house are located two cross compound crank and fly wheel pumps, having a capacity of 1500 gal. per minute lifting water from the gravity well

to a 100,000-gal. capacity steel tank located at the top of a 70-ft. tower directly over the pumps. Condensing water for the turbine is taken from this well and delivered to the condenser by two motor-driven centrifugal pumps.

M Glauber & Co., manufacturers of plumbing specialties, have removed from 10 and 12 Christopher street to 101 and 103 Varick street, New York, where they enjoy better arrangements for conducting their business and considerably improved shipping facilities.



The Shears and Other Machinery in the Shipping Department Opposite the End of the Conveying Cooling Tables

United States Steel Corporation's 1911 Report

As the annual report of the United States Steel Corporation was received at a late hour on March 19, it was impossible to give it adequate attention in *The Iron Age* of March 21. We now supplement the extracts given on page 735 of that issue with further details of the operations of the corporation in the year ended December 31, 1911.

Condensed Balance Sheet

Following is a condensation of the general balance sheet as of December 31, 1911, compared with that of a year previous:

	1911	1910
Assets		
Property account	\$1,460,303,982.84	\$1,430,212,860.76
Deferred charges	9,208,581.99	8,331,704.91
Investments	2,383,885.06	2,369,394.04
Sinking and reserve fund assets	13,149,161.83	16,067,905.24
Investments	2,383,885.06	2,369,394.04
Accounts receivable	48,325,472.88	44,603,273.53
Bills receivable	6,100,874.27	5,540,180.77
Agents' balances	786,758.59	696,833.76
Marketable stocks and bonds	2,047,100.18	4,410,793.61
Cash	43,499,127.78	56,953,514.16
Total assets	\$1,739,288,533.58	\$1,745,724,284.49
Liabilities.		
Common stock	\$508,302,500.00	\$508,302,500.00
Preferred stock	360,281,100.00	360,281,100.00
Outstanding stock subsidiary companies	596,702.50	620,352.50
Bonded and debenture debt	620,501,376.83	596,351,866.70
Mortgage and purchase money obligations subsidiary companies	1,152,922.79	3,097,792.38
Accounts payable and payrolls	22,938,620.87	23,695,264.04
Bills payable	41,743.59	813,500.00
Special deposits or loans due employees	911,580.14	886,122.16
Accrued taxes	6,712,858.36	6,789,827.16
Accrued interest	8,372,555.73	7,991,373.15
Preferred dividend, payable February 28	6,304,919.25	6,304,919.25
Common dividend, payable March 30	6,353,781.25	6,353,781.25
Reserve funds	23,126,677.19	20,092,727.91
Appropriations for capital expenditures	40,000,000.00	40,000,000.00
P. and L. surplus	133,691,195.08	164,143,157.99
Total liabilities	\$1,739,288,533.58	\$1,745,724,284.49

Inventories

An explanation of the apparent loss in surplus shown above was given last week. The reduction in 1911, due to deducting from inventories the profits earned by subsidiary companies on inter-company sales of products, is indicated in the following classification of inventory valuations at December 31, 1911, as compared with a year previous:

	1911.	1910
Ores	\$73,642,448	\$80,345,434
Pig iron, scrap, and ferro.	6,998,670	7,348,570
Coal, coke and other fuel	3,728,595	4,282,791
Pig tin, spelter, copper, nickel, aluminum and dross	6,536,069	5,385,399
Limestone, fluxes and refractories	2,000,130	2,281,845
Rolls, molds, annealing boxes, etc.	6,101,885	5,776,398
Manufacturing supplies and sundry items	13,682,475	13,467,993
Ingot-steel	1,278,318	1,001,785
Blooms, billets, sheet and tin bars, etc.	7,756,691	7,755,479
Wire rods	829,461	941,101
Skelp	968,516	910,598
Finished products	32,737,559	31,913,767
Mining supplies and stores	3,163,242	3,183,109
Railroad supplies and stores	3,350,134	3,631,629
Merchandise of supply companies	748,004	771,429
Material, labor and expense locked up in bridge and structural contracts less bills rendered on account	5,401,293	2,649,990
Stocks abroad and on consignment	5,351,377	3,957,616
Material in transit	1,792,322	1,390,365
Bills rendered account work done on sundry material in process of manufacture		Cr. 457,474
Total inventory valuations to subsidiary companies	\$176,067,189	\$176,537,824
Amount included therein representing profits of subsidiary companies on inter-company sales of materials and products on hand	22,583,600	33,704,439
Valuation exclusive of inter-company profits	\$153,483,589	\$142,833,385

Maintenance and Extraordinary Replacements

The expenditures made by all companies in 1911 for maintenance and renewals, including the relining of blast furnaces, and for extraordinary replacements, in comparison with expenditures for the same purposes during the preceding year, were as follows:

	1911	1910
Ordinary maintenance and repairs	\$37,882,850.77	\$40,818,899.32
Extraordinary replacements	7,077,414.37	8,489,285.64
Total	\$44,960,265.14	\$49,308,184.96

The entire amount of the foregoing expenditures was charged to current operating expenses and to depreciation and replacement funds reserved from earnings.

Employees and Pay Rolls

The average number of employees in the service of all companies during the fiscal year of 1911, in comparison with the fiscal year of 1910, was as follows:

	1911	1910
Manufacturing properties	140,118	154,563
Coal and coke properties	21,723	23,328
Iron ore properties	14,445	16,956
Transportation properties	17,963	20,758
Miscellaneous properties	2,639	2,630
Total	196,888	218,435
Total annual salaries and wages	\$161,419,031	\$174,955,139

Employees' Stock Subscriptions

In continuance of the plan observed in previous years, beginning with 1903, the employees of the United States Steel Corporation and the subsidiary companies were, in January, 1912, offered the privilege of subscribing for preferred or common stock. The subscription price was fixed at \$110 per share for the preferred and \$65 per share for the common. The allowances for special compensation or bonus to be paid subscribers who retain their stock were fixed at \$5 per share per year for the preferred and \$3.50 per share annually for the common. The conditions attached to the offer and subscription, aside from the features of subscription price and the amount of special compensation or bonus to be paid, were substantially the same as those under which stock has been offered to employees in each of the previous nine years.

Subscriptions were received from 36,946 employees for an aggregate of 30,619 shares of preferred and 30,735 shares of common stock.

Extracts from Chairman E. H. Gary's Remarks

The output of finished products for sale was only about 67 per cent. of the full normal productive capacity of the plants. The decrease in output was most marked in those classes of materials used largely by railroads: rails, track fittings and steel carbuilding material. The decrease in business done as represented by total tonnage output of finished steel products was 11.7 per cent. in comparison with 1910. In the domestic trade the decrease was, however, considerably greater, namely, 18.6 per cent., while in the export business there was an increase of 41.4 per cent. The following is a statement of export shipments:

	1911 Tons	1910 Tons
Rolled steel and other finished products	1,719,272	1,216,057
Pig iron and scrap	26,728	6,974
Sundry materials and by-products	492	465
Total tons all kinds of materials, except cement	1,746,492	1,223,496
Cement (bbls.)	110,364	=====
Aggregate tonnage of rolled steel and other finished products shipped to both domestic and export trade	9,460,169	10,727,751

The amount of bonds, mortgages and purchase money obligations of the corporation and subsidiary companies paid off during the year was \$11,021,359.46. Of this total, \$7,751,000 represents bonds retired under sinking fund provisions. Bonds of subsidiary companies to the amount of \$14,854,000 were issued and sold for account of outlays for construction expenditures and in the refunding of maturing bonds. There were also issued \$17,712,000 of subsidiary company bonds in payment for the Pittsburgh-Monongahela coal property purchased, and there were assumed \$600,000 of outstanding bonds on warehouse property purchased in San Francisco.

There was expended during the year by the corporation and the subsidiary companies for additional property, extensions and construction, and for stripping and development work at mines the net sum of \$49,430,861.12, as follows:

For purchase of Connellsville coking coal properties..\$17,707,280.79
 For the Gary extensions..... 7,939,813.46
 For Tennessee Coal, Iron & R. R. Co. extensions... 5,069,983.85
 For all other properties, extensions and betterments.. 18,713,783.02

Total\$49,430,861.12

At the close of the year the amount of unexpended appropriations for construction and extraordinary replacements, including the 1912 programme for stripping and development work at iron ore mines, was approximately \$20,000,000, but it is probable that not all of this amount will be expended during 1912. These authorizations cover a wide range of miscellaneous additions and improvements at various points, but none of them, aside from that for the new steel plant at Duluth, is of magnitude. The before mentioned total includes about \$5,500,000 for additional work at Gary in finishing the improvements heretofore determined upon.

THE GARY DISTRICT EXPENDITURES.

At the close of the year nearly all of the manufacturing plant construction heretofore authorized for the Gary district had been completed. At the steel plant of the Indiana Steel Company the sheet bar mill was completed and put in operation June 29, 1911; the two 12-in. and the 10-in. merchant bar mills September 1, 1911; the 60-in. plate mill November 4, 1911. The first battery of the by-product coke plant, consisting of 70 ovens, went into operation April 12, 1911, and 4 additional batteries at various later dates in 1911. The full capacity of this plant, comprising eight batteries of 70 ovens each, will be completed by April 1, 1912. The third unit of open-hearth furnaces, consisting of 14 furnaces of 65 tons capacity each, was placed in operation in February, 1912. An addition to the electric power station, consisting of six generators of 3000 kw. each, driven by gas engines, was completed during the year.

The several units of the sheet plant of the American Sheet & Tin Plate Company and of the bridge and structural plant of the American Bridge Company, both at Gary, were completed and commenced operations at various dates during the year.

The output of the Gary steel plant of the Indiana Steel Company in 1911 was 707,273 tons of pig iron, 1,036,545 tons of open-hearth steel ingots, 281,980 tons of open-hearth steel rails and 469,360 tons of various other rolled steel products. The by-product coke plant produced 811,804 tons of coke. The production of the sheet plant was 24,556 tons of black and galvanized sheets, and at the bridge plant there were produced 27,371 tons of fabricated steel work.

The total amount expended to December 31, 1911, at Gary by the several subsidiary companies for acquirement of real estate, development and construction, was as follows:

For real estate (exclusive of that occupied by the manufacturing plants) and for development and construction work in the city of Gary, less credits for lands, lots and houses sold.....\$9,966,520.16
 For construction of the manufacturing plants, together with cost of land occupied by them..... 62,719,664.75
 For terminal railroad work..... 5,572,323.70

Total\$78,258,508.61

The funds for the payment of the foregoing have been provided from the following sources:

From surplus specially appropriated.....\$65,000,000.00
 From depreciation allowances raised by subsidiary companies on other of their properties and invested in the Gary property..... 1,510,000.00
 By Chicago, Lake Shore & Eastern Railway Co. issue and sale of its bonds..... 5,258,405.32
 And the balance has been provided by subsidiary companies interested from their surplus and working capital..... 6,490,103.29

Total\$78,258,508.61

In addition to the outlays made as above for capital expenditures at Gary, the companies have also invested a considerable amount in inventories and working capital required for the operation of the plants.

There was purchased in May, 1911, for warehouse purposes, the property of the Risdon Iron & Locomotive Works in San Francisco, California. The plant had previously been operated in the ship and engine building and repairing business, and had for a long time been offered for sale. The property consists of about 20 acres of land, with considerable water front, is well located and has on it several buildings especially adapted for the storage and warehousing of steel products. It is believed that by carrying on the Pacific coast large and varied stocks of the products of the subsidiary companies their distribution will be materially expanded.

Substantial progress was made during the year on the construction of the new steel plant at Duluth, Minn. The expenditures for the plant and the terminal railroads serving it amounted for the year to \$1,437,518.

An additional outlay of \$1,037,969 was made in payment for coal property in Illinois and Indiana, the purchase of which had been contracted for in previous year, and for the development of the properties.

There were purchased by the subsidiary transportation companies during the year 41 locomotives, 893 freight cars and 71 road and service cars. There were also purchased and placed in commission three 12,000-ton steamships for service in the ore carrying trade on the Great Lakes; and there was acquired one additional ocean-going freight steamer for service in the export trade.

PENSION AND RELIEF FUNDS.

There was set aside from the accumulated undivided surplus the sum of \$663,018.37 for permanent pension fund, reference to which was made in last year's annual report. Of the foregoing amount \$163,018.37 was paid over in cash to the board of trustees of the United States Steel and Carnegie Pension Fund for use by the board as cash working fund. A like amount for similar purpose was also contributed by the Carnegie Relief Fund. The balance of the appropriation first mentioned, together with the \$1,000,000 set aside in previous years for pension purposes, is carried to credit of pension fund in general balance sheet. During the year the corporation also paid over to the board of trustees \$156,301.70 which was charged to current operations. This amount, together with the \$200,000 of income received by the trustees from Carnegie Relief Fund (being the income on the \$4,000,000 fund created by Mr. Carnegie), and making a total of \$356,301.70, was disbursed by the trustees during the year for pension and relief purposes. At the close of the year there were 1606 ex-employees on the pension rolls.

In the annual report for 1906 reference was made to the arrangement which had been consummated for a lease of the so-called Great Northern Railway ore properties by the Great Western Mining Company, a subsidiary company of this corporation. In accordance with an option reserved to the lessee to cancel the lease on January 1, 1915, the Great Western Mining Company on October 26, 1911, formally notified the lessors that the company elected to cancel the lease. To December 31, 1911, there had been mined and shipped under this lease 7,832,137 gross tons of ore, and royalties had been prepaid on account of minimum tonnages for years prior to 1911 covering an additional 2,892,183 tons. It is expected this prepaid tonnage, as well as the minimums called for by the lease for years 1912, 1913 and 1914, namely, 15,750,000 tons, will be mined and shipped prior to 1915, thus making an aggregate of 26,474,320 tons of ore which it is expected will be shipped under the lease prior to its relinquishment on January 1, 1915. This total tonnage is equal to about one year's ore requirements of the blast furnaces of the subsidiary companies (exclusive of those of T. C. I. & R. R. Co.) on the basis of the furnaces operating normally full throughout the year.

On October 26, 1911, the United States Government filed a petition in the Circuit Court of the United States for the District of New Jersey against the corporation and a number of its subsidiary companies, alleging that the corporation and its codefendants are in violation of the act of Congress of July 2, 1890, and asking that they be adjudged to be illegal and that they be dissolved.

Noteworthy Plant Improvements

The report, as usual, enters into great detail regarding work completed during the year and in progress at the close of the year at the various plants of the subsidiary companies. Noteworthy among the improvements completed in 1911 are found the following items:

Carnegie Steel Company, Homestead Works, four additional 55-ton open-hearth furnaces at plant No. 4.

Illinois Steel Company, South Works, new light structural mill; installation of four gas-driven blowing engines at blast furnaces Nos. 5 to 8, and equipping structural mill No. 1 for rolling sections from 18 to 24 in.

American Steel & Wire Company, Central Furnaces, new blast furnace D. Salem Works, 48 American felt roofing nail machines and a building for housing them.

Rockdale Works, 67 additional wire drawing blocks and electric power plant and motor equipment. Worcester North Works, 30 additional wire drawing blocks. The plant and patents of the American Post Company were acquired. There were constructed for installation at various works four automatic concrete fabric machines, 10 Anthony fence machines, and 13 National fence machines.

Union Steel Company, South Sharon Works, 30 additional wire drawing blocks.

Tennessee Coal, Iron & Railroad Company, Ensley Works, equipment of the rail mill to roll 4-in. billets. Bessemer Rolling Mills, bar twisting department, for concrete reinforcement bars. Central electric power plant, 12,000-kw. turbo-generator equipment, to provide electric power for the Ensley plant, the new by-product coke plant and coal washer, and the new wire plant of the American Steel & Wire Company.

The construction of the American Steel & Wire Company's new rod and wire mill at Birmingham, Ala., was continued, expenditures to the amount of \$1,122,802.22 having been made thereon during the year.

Enumerated among the details regarding work in progress are the following:

Illinois Steel Company, Joliet Works, new electric power plant and motors replacing steam power.

American Bridge Company, Ambridge Works, extending launching ways, handling facilities and equipping plate shop for steel barge construction.

Tennessee Coal, Iron & Railroad Company, by-product coke plant, new plant of 280 coke ovens, Koppers type.

Minnesota Steel Company, Duluth plant. Substantial progress was made in the construction of the several units of this plant, the expenditures for the year totaling \$1,323,569.77.

The attention given to safeguarding workmen and to caring for their welfare is shown by the enumeration among improvements of expenditures for various safety appliances and for welfare work as follows:

Carnegie Steel Company, Ohio Works, floors on skip bridges to protect employees at blast furnaces Nos. 1 and 2.

Illinois Steel Company, Joliet Works, equipping 26 electric overhead traveling cranes with safety appliances.

Universal Portland Cement Company, equipping for safety of employees cement plants Nos. 3, 4, 5 and 6.

National Tube Company, National Works, safety devices to protect employees. Lorain Works, safety devices at blast furnace No. 1.

American Steel & Wire Company, Worcester South Works, emergency escape from crane cabs in open-hearth department. Central furnace docks, safety equipment on ore handling machinery.

American Sheet & Tin Plate Company, Wood Works, installing safety devices throughout the plant. Vandergrift Works, new emergency hospital.

H. C. Frick Coke Company. As part of a general plan to better the living and sanitary conditions surrounding the various works affecting the welfare of employees, expenditures totaling \$273,700.61 were made for improvements to tenement houses and the drainage systems therefor and surrounding thereto, at 40 of the coke plants. Edenborn Works, additional ventilating and escape shaft. Leisenring No. 1 Works, swimming pool.

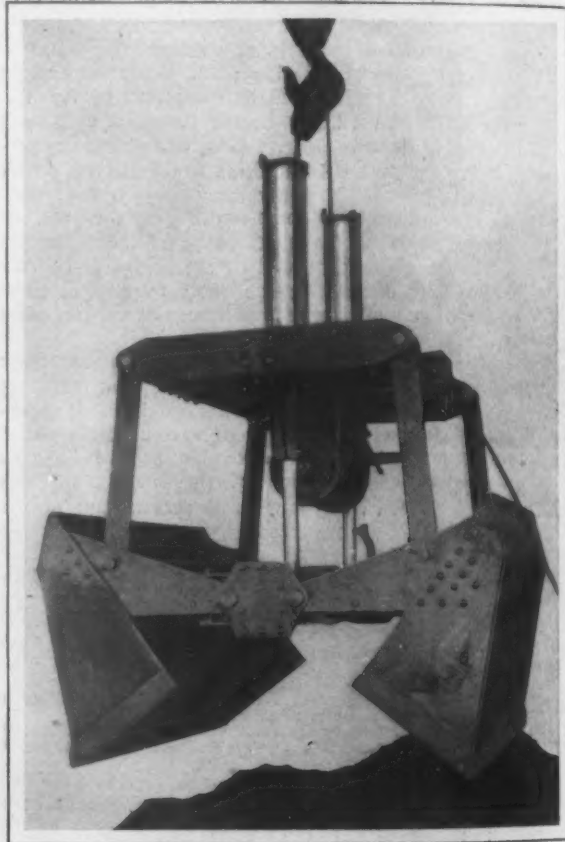
The Bucyrus Company, South Milwaukee, Wis., has taken over the manufacture of the Atlantic type steam shovel, heretofore built by the American Locomotive Company, and under a license from the patentee, A. W. Robinson, it is the expectation to continue making all the sizes previously built, and to eventually have a complete line of Atlantic wire-rope shovels, in addition to a complete line of Bucyrus chain type shovels, which it has been building for 30 years. The building of the Vulcan shovels has been transferred by the Bucyrus Company from Toledo, Ohio, to the new plant at Evansville, Ind. A stock of repair parts will be carried at Montreal, New York, San Francisco and Spokane, in addition to a very full supply at the South Milwaukee and Evansville plants.

Scully-Jones & Co., 316 Railway Exchange Building, Chicago, have been appointed exclusive agents in Illinois, Indiana, Iowa and Wisconsin, for Elco high speed steel manufactured by Vickers, Sons & Maxim, Ltd., Sheffield, England.

The Watters Grab Bucket

Arrangements have just been completed by the Whiting Foundry Equipment Company, Harvey, Ill., for the exclusive right to manufacture and sell the Watters quick detachable grab bucket. One of the special features of this bucket is that it operates with a minimum amount of head room and will perform in a few hours' work that would ordinarily keep a dozen laborers busy an entire day. When not in use the bucket can be quickly detached, leaving the hook free for regular service. One of the special fields in which this bucket can be used is in the foundry where it can be employed for cleaning floors, cutting or cooling sand, filling large molds, transferring sand from the shaking out to the molding floor and for removing refuse. Other applications are the loading and unloading of coal, coke, clay, crushed stone, gravel, etc.

This bucket can be handled by an ordinary crane by simply inserting the crane hook in the yoke to which the bucket operating ropes are attached. The act of lowering the crane hook sets the latch mechanism and spreads the bucket to its full extent as shown in the accompanying engraving. The raising of the hook closes the blade and



The Watters Quick Detachable Grab Bucket Made by the Whiting Foundry Equipment Company, Harvey, Ill.

picks up the load. Pulling the hand rope attached to the latch lever which can be controlled by the regular crane operator from his cage or from the floor causes the contents to be dumped. All the shock to either crane or the bucket caused by the emptying of the load can be absorbed by a special cylinder device.

Three different sizes of bucket, having capacities of 1, 1½ and 2 cu. yd., are made. In a recent test of the largest size 40 tons of sand was unloaded from a gondola car in 20 min., the only manual labor employed being that of the crane operator.

The Erdle Perforating Company, Rochester, N. Y., maker of perforated sheet metal and plates, has opened an office at 16 Court street, Brooklyn, N. Y., and W. P. Davis has been appointed in charge of the branch. The company reports doubling its business in three years.

On March 12 ground was broken at Monessen, Pa., for two blast furnaces and four open-hearth steel furnaces to be erected by the Pittsburgh Steel Company.

A 1-in. Automatic Drilling Machine

With a view to bringing out a drilling machine which would handle work with the maximum rapidity obtainable under the conditions of high speed drilling, Baker Brothers, Post street, Toledo, Ohio, have brought out the new type shown in the accompanying engravings. It was developed to minimize the time required to drill a hole in a piece of metal by reducing the time required to place the work in position, advance the tool to the work through the jig bushing or clearance space, engage the feed, withdraw the tool and remove the work as much as possible. The operations are performed automatically, without, it is explained, developing complications in construction. The operating side and the rear of this new tool are shown in Figs 1 and 2 respectively.

The feed of the machine is secured by cams, an arrangement which it is pointed out gives a powerful feed combined with a quick return. The feed also has a dwell at the end which enables the drill to be used for facing work. This feature, that of facing to an exact depth, it is emphasized is one which is not generally possible on a power feed drilling machine. The cam on the revolving cam drum which provides the feed acts over a roll on the spindle saddle and in combination with the quick change gears gives any desired feed. Another special feature of this type of feed is that the correct lead can be secured for threading.

The spindle, which is of high carbon hammered crucible steel, is large, the minimum section being $1\frac{1}{4}$ in. It is mounted in a bronze bushed slide which works in carefully scraped ways. The travel of the spindle is 6 in. and a No. 3 or No. 4 Morse taper is provided. The distance from the frame to the spindle center is 8 in. The running bearings of this machine are Hess Bright D. W. F. ball bearings and the thrusts are all taken on ball bearings. The driving pulley runs on ball bearings surrounding a vertical post within which the spindle runs, being driven from this pulley by a self-centering drive.

Two different types of table are provided, a plain and an automatic indexing one. With the former type the operator places the work under the drilling spindle and trips the machine in the same way a punch press is operated. The spindle advances quickly to the work, the cutting tool passes through the piece and the feed stops, after which the operator removes the finished piece of work and substitutes another and again starts the machine by tripping the foot lever. In this way it is possible for him to use both hands in handling the pieces and secure a high rate of production.

The revolving table has an automatic indexing motion which is shown in Fig. 2. At the instant the spindle is withdrawn from the piece being drilled, this motion indexes the table to the next position, thus bringing a new piece of stock under the working tool. The time occupied by the withdrawal of the tool and the indexing of the table is 2 to 3 sec. To give any desired number of

divisions from 5 to 80 change gears are provided for the indexing mechanism. Since the table has an in and out movement the machine can be employed to drill holes in circles of any radius within the capacity of the drill by using the proper change gears. The standard machines will drill holes in circles ranging from 4 to 20 in. in diameter. The table also has a scale which shows at once the setting with reference to the diameter of the circle.

The machine can also be used for chuck work and from six to eight chucks are ordinarily provided for the table. When equipped for this work as shown in Fig. 1, all the operator has to do is to chuck and remove the work. If a drill should break it is possible to stop the machine without delay at any point, and if it is desired, the machine can be arranged to index so that any number of chucks can be skipped. The use of the automatic indexing mechanism also permits the operator to look after one or more machines easily.

The spindle is driven by a 2-in. belt on a cone pulley, the diameter of the largest step being 18 in. Six speeds

ranging from 200 to 800 r.p.m. are available. Three of these are secured by the three-step cone pulley which drives the spindle and this number is doubled by the use of a two-speed countershaft. The machine itself can be driven by a belt or an electric motor as may be desired. In tests which have been made of the machine eight $\frac{3}{4}$ -in. holes have been drilled through a piece of cast iron $\frac{3}{4}$ in. thick in a minute and this rate was maintained for a considerable period.

The Standard Welding Company, Cleveland, Ohio, has a large amount of work on hand from automobile concerns and is running its plant double time.

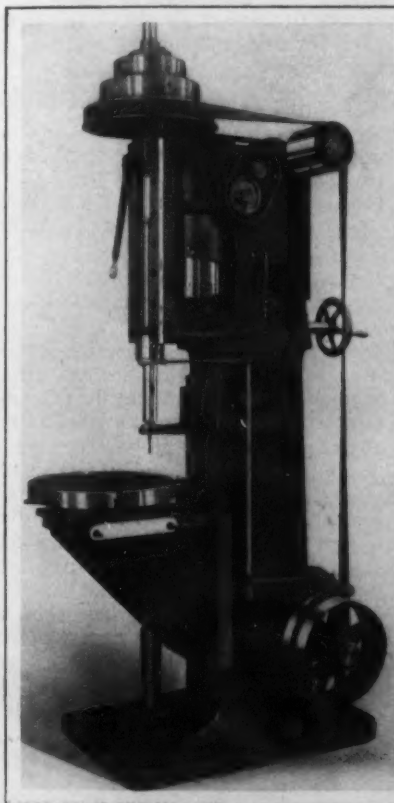


Fig. 1—Operating Side View of a New Automatic Drill with Cam Feed Built by Baker Brothers, Toledo, Ohio

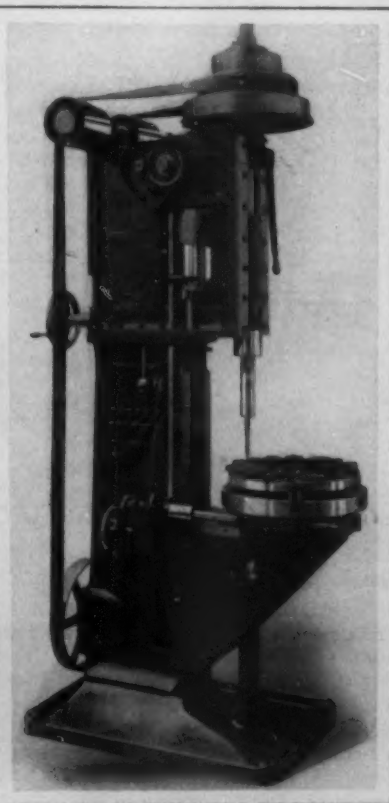


Fig. 2—Rear View of a New Automatic Drill with Cam Feed Built by Baker Brothers, Toledo, Ohio

Cleveland Superintendents and Foremen

The annual meeting of the Cleveland Shop Superintendents' and Foremen's Club, Cleveland, Ohio, was held March 16. Officers were elected for the ensuing year as follows: President, John Mortimer, Central Brass Works; vice-president, L. W. Bosley, Cleveland Hardware Company; treasurer, Fred. Sebelin, Hill Clutch Company; sergeant-at-arms, Charles Schork, W. M. Pattison Supply Company. Executive Committee, president, vice-president and treasurer, and Emmett Leckner, Chandler & Price Company; Adam Herkner, Warner & Swasey Company; G. W. Ward, Glauber Brass Mfg. Company; George Decker, Warner & Swasey Company; Julius Walt, Cleveland Punch & Shear Works Company. Membership Committee, John Iplady, Variety Iron & Steel Works Company; John Francis, Kilby Mfg. Company; William E. Kelley, Kelley Reamer Company; Timothy Kellackey, Oster Mfg. Company, and S. S. Bolton, Chandler & Price Company. An interesting talk was given by Ralph E. Flanders, Fellows Gear Shaper Company, Springfield, Vt., on "Gears and Gear Cutting."

Steel Rivets*

Practical Suggestions for Users

BY D. J. CHAMPION.

Rivets are the most important articles you use. On their trustworthiness, life and property depend, and for this reason too much importance cannot be attached to guarding the quality and looking after the workmanship in order to insure, as nearly as possible, perfection, along these lines.

Improvements in the quality of rivets have kept pace with the improvements in the manufacture of steel, and excel them to some extent. Twenty years ago, steel rivets were practically unknown, and the conservative boiler-maker would throw his hands up in horror even at the mere mention of them. So great was the antipathy against them that one of the leading manufacturers who was then successfully producing steel rivets was afraid to call them by their proper name, "steel rivets," and sought to appease the prejudice against them by using the misnomer, "semi-steel."

How Soft Steel Has Worked a Great Change

The word "steel" was formerly used to indicate hardness and brittleness; that is, it conveyed the idea of an unyielding metal, principally intended for razors, swords, chisels, plowshares, gun barrels, or other articles of like hardness that required a very good strong, stiff material that would wear well. With the advent of basic open-hearth steel, however, a metal was placed on the market that was a surprise even to the most skeptical. The metallurgist and the steel maker worked hand in hand to make this metal thoroughly reliable, and the result today is that good, soft basic open-hearth steel cannot be surpassed for the manufacture of good rivets or other articles requiring the maximum of strength and toughness.

The great desideratum long sought for, namely, low sulphur and low phosphorus, was attainable for the first time by the use of this process of steel manufacture. So great have been the improvements in the manufacture of this steel, and so responsive under intelligent management have been the furnaces and rolling mills for the manufacture of it that it is put on the market to-day as a very reliable product at a reasonable price.

The Purity of Steel

For the enlightenment of those who still lean toward iron in preference to this steel, let it be said that this steel is over 99 per cent. pure iron and much more reliable for the production of rivets than the best Norway iron. This is not meant to convey the idea that good iron, either Norway or best charcoal bloom, has not its uses for certain purposes, for instance, where the action of the contents of a vessel has a tendency to oxidize the metal to such an extent that more is expected of the rivets than of the plates into which they are driven. But what I contend is that for all other purposes where rivets are used mild steel is superior to iron.

Those who will recall their troubles of years past when they used charcoal hammered iron for boiler plate and the best iron for rivets can now appreciate the truthfulness of my assertions in regard to the improvements made in the manufacture of steel. Steel today in the shape of boiler plate, bars, shapes, or rivets, is ideal, compared with the product put before the public 20 years ago. Failures in the use of it are now very rare. The steel maker knows how to make it, the workman understands better how to handle it, and there is no question but that their work will come up on final test to their highest expectations. In line with the progress of the age in which we live, more and more is expected of every piece of power machinery manufactured, and if it were not for the improvements made in the manufacture of steel it would be a physical impossibility to accomplish what we are accomplishing today.

The Severe Treatment Given to Rivets

A structure is no stronger than its weakest member, and this applies to the rivets in a structure in an emphasized sense. Did you ever stop to consider that rivets, of all the articles you use, are often tested to the death, and even then are expected to stand up and fill their place in the

structure just as well as the plates into which they are driven, though these plates have not been heated or hammered or treated one-quarter as harshly as the rivets that hold them together? In other words, to use a homely expression, good rivets are expected to be "fool proof," and if not "fool proof" they are often condemned. Would any of you tolerate your flange turner to hammer on a plate when it is blue? Yet very frequently you allow your rivet drivers to hammer on rivets until they are "black and blue," and condemn them if unfortunately the heads come off.

Rivet making, to use the expression of one of our worthy members, is an art, and a few of us have shown a disposition to acquire that art and work faithfully to gain our ambitions along these lines. Suffice it to say that if "eternal vigilance be the price of success," then the rivet field offers ample opportunities to the painstaking and ambitious. When I recall the difficulties that presented themselves in putting on the market a rivet above criticism, I heartily agree with the member referred to that the making of satisfactory rivets is an art, and not a lost art either. The gentleman to whom I refer enjoys the satisfaction of driving thousands of rivets every year, and I have his own statement that he is never obliged to call a single rivet.

Nicking and Bending

Too much importance must not be placed on the very interesting but misleading test of nicking and bending. It is a test intended for iron, not steel. Good iron is fibrous in its structure and will stand the test admirably, whereas steel may be of a granular structure and consequently should not be expected to stand this test like iron. If you should be in doubt about the superiority of one steel rivet over another, and you are inclined to test out the rivet by nicking and bending, I would suggest that you subject the two rivets to a heat suitable for driving, and then allow them to cool until both are entirely cold. Then nick and bend and you will find that the good rivet will show a good, clean fracture, free from crystallization but it will not bend and show a coarsely fibrous fracture like iron.

The nicking and bending test should never be used on a steel rivet to show fiber, for the structure of a good steel rivet may be finely granular instead of fibrous. Fine fibrous structure is, of course, noticeable in a steel bar of small diameter after coming from the rolls. At this stage the bar, under the nicking and bending test, would bend flat on itself without breaking and show a finely fibrous structure. But we should not expect to get this result after the double heating which must be given the bar in order to make the rivet. The United States Government realizes this fact and does not require rivets for its use to stand the nicking and bending test. If made at all, it is only to show the appearance of the fracture.

Suggestions from Experience

Under the caption of "experiences," I am led to reproduce here a few suggestions which I consider of sufficient merit to have them copyrighted. They are as follows:

1. Hold some reliable maker responsible for the quality and workmanship of the rivets you drive.
2. Where the holes are not reamed, see that inside surfaces of the holes are parallel to each other without undue overlapping.
3. Heat your rivets intelligently, grading the degree of heat to conform to the work you are doing, allowing
 - Hand driven rivets to come to an almost white heat;
 - Pneumatic driven rivets to come to a bright cherry red; and
 - Hydraulic driven rivets to a dull cherry red; bearing in mind at all times the amount of pressure your machine is capable of putting on the rivets at the point of upset, and regulating the heat accordingly—the lower the heat, the greater the pressure—relaxing the pressure when the rivet is cold, or nearly so.
- Such rivets will fill the holes and avoid undue shrinking and, possibly, calking.
- When high pressure work is being riveted, ream the holes 1/32-in. full only, as tighter work can then be done.
4. Never continue hammering (on either end of the rivet) until it is blue.
5. Never try to fill a hole with a rivet smaller than the regular diameter required for such hole, which in all good work is 1/32-in. larger, bearing in mind that steel expanded by compression (as in the case of a rivet shank expanded to fill the hole that is more than 1/16-in. larger) is materially weakened in all its qualities of strength. Therefore, the closer the fit, the tighter and stronger the joint.

*Paper read before the American Boiler Manufacturers' Association, New Orleans, March 13, 1912.

6. Never use heavy pneumatic tools on small rivets. In other words, never use a tool out of proportion to the size of the rivet.

7. Never drive a cold made rivet cold without first annealing.

8. Never introduce a high-pressure blast into your rivet heating furnace unless you break the flame by a fire wall, and even then a graduating valve should be used, reducing the pressure so as not to be over 15 lb., bearing in mind that only sufficient rivets be placed in the fire as can be conveniently handled by the driver without allowing them to soak too long, or becoming scaled.

9. Never allow your rivets to soak in the fire, either during the noon hour or over night. If a cessation of work is contemplated, draw them out of the fire, but avoid replacing them in the fire. If they have had too much heat previous—use new ones.

10. Never pass up to the driver a rivet showing that the metal therein started to melt. Such a rivet will cause trouble ultimately, as it is liable to remain loose in the hole, or lose its head if calking has to be done.

If you follow out these suggestions faithfully, you will never have trouble with good steel rivets.

During the past 40 years we have made wonderful improvements in the manufacture of steel, and we doubt if history can produce a record anything like its equal. When Kelly, the inventor, sat before his father's melting furnace, and discovered for the first time how forced air could be utilized in the manufacture of iron, he opened to the world the possibilities of this essential and wonderful metal. Since then we have seen one improvement after another, until today we consider our progress well nigh perfect.

But we must not rest contented here, feeling that perfection has been reached. As we all realize, history repeats itself, and if history repeats itself, as regards the manufacture of steel, as rapidly during the next 40 years as the past 40, it will be difficult to conceive just where we shall land. When we consider the improvements in steel in our present day, made possible by the introduction of vanadium, nickel, chrome, manganese, etc., as alloys, we find it difficult to even attempt to portray its possibilities, and still be considered entirely normal. What with lap welding, electric welding, acetylene welding, and lock bar joining, to say nothing of the celebrated Diesel engine, we are led to ask what shall become of the necessity of the riveted joint, but we must pacify ourselves with the thought that at every stage of progress we should find ourselves perfectly conscious of the improvements being made, and none of us should be found lax in our determination to keep abreast of the times, and determine to be able to give as good an account of ourselves when the time comes.

Sheet and Tin Plate Manufacturers' Meeting

A meeting of the Association of American Sheet & Tin Plate Manufacturers was held in the Fort Pitt Hotel, Pittsburgh, March 22. W. S. Horner, district manager at Pittsburgh of the American Rolling Mill Company, Middletown, Ohio, presided, and J. J. O'Connor of the Washington Tin Plate Company, Washington, Pa., was secretary. The following named concerns were represented in person: Allegheny Steel Company, Parkersburg Iron & Steel Company, Canonsburg Steel & Iron Company, American Rolling Mill Company, Brier Hill Steel Company, De Forest Sheet & Tin Plate Company, Seneca Iron & Steel Company, Massillon Rolling Mill Company, Stark Rolling Mill Company, Carnahan Sheet & Tin Plate Company, Washington Tin Plate Company, Newport Rolling Mill Company and Osterberg Tin Plate Company.

One of the subjects fully discussed was a uniform contract for the sale of sheets and tin plate. It has been recognized for a long time that orders for sheets and tin plate were simply options, which the buyer exercised if it was to his benefit to do so. A resolution was adopted that "a committee of three be appointed with instructions to present at the next meeting of the association a standard form of contract for general adoption by the sheet and tin plate manufacturers, with a view to its use in the enforcement in the making of sales of sheets and tin plate." This committee consists of Wade A. Taylor, De Forest Sheet & Tin Plate Company, Niles, Ohio; Edward Langenbach, Stark Rolling Mill Company, Canton, Ohio, and George T. Thomas, Carnahan Tin Plate & Sheet Company, Canton, Ohio.

The invitation issued by President Taft for a conference at Washington, D. C., April 15 of commercial organi-

zations was considered, and the association appointed W. S. Horner to represent it on that occasion.

Another subject that was fully discussed was the compilation of confidential information as to operations of the mills of the different members and the amount of tonnage of sheets and tin plate on their books, so that a composite report could be made up as to the percentage of operations as a whole of the sheet and tin plate mills. It is not intended that this information shall be disclosed as from individual mills, but only as a composite report, the individual reports made by the different mills to be destroyed. Other matters of interest, such as the general condition of trade, were informally considered. All the members are enthusiastic as to amount of good the organization can accomplish for the sheet and tin plate trades if it is conducted along the proper lines. No attempt is made to control prices, and, as the association is operating under a charter, any objections heretofore made by certain manufacturers of sheets and tin plate against joining it are regarded as having been removed. It is believed, therefore, that in a very short time a number of the leading sheet and tin plate mills that are not now members will join the organization. Another meeting will be held about April 10.

Improved Business in Cleveland

That business conditions have improved materially in Cleveland, Ohio, is shown by a report made March 23 by Secretary Philip Frankel of the Cleveland Branch, National Metal Trades Association, following a special inquiry among a large number of shops in metal working lines. The report is, in part, as follows:

Business conditions today are far better than they were a year ago this time, when a similar investigation was made. Only two manufacturers reported business as poor; almost every one reported it fair or good, or that there was a considerable improvement since January 1, 1912. Many of the manufacturers said that business was very good, some reporting it as being satisfactory and up to the average, and others going so far as to say it was better than ever before. Manufacturers of automobiles and automobile parts report business as being "splendid" and "constantly increasing."

To the gratification of the association, it was learned that in the metal trades industry in Cleveland there was not a reduction in wages made by any one in any instance. There was no indication of any undue agitation, unrest or dissatisfaction among the workers employed in the factories. The reports showed that there was no labor trouble of any kind in any of the factories in the metal trades industry in Cleveland in the past year.

Many of the reports suggested that the association extend the operations of its Labor Bureau Department, making the bureaus even more effective if possible in the employment of men for its members and in the various investigations which it makes.

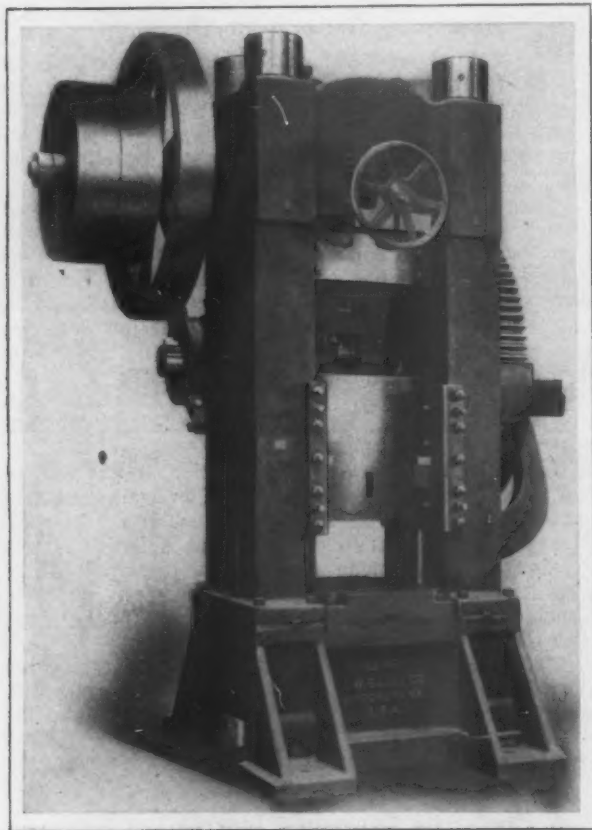
A Powder for Converting Low Carbon Steels.—A powder to which has been given the name of Stelpro is marketed by the American Infusion Steel Process Company, 60 Broadway, New York City, as a means for converting low carbon Bessemer and open-hearth steels heated in contact with the powder to high carbon steels suitable, for example, for tool work. In a 36-page booklet illustrating at length what has been done with the powder are shown a number of articles like milling cutters, steel pinions and castings which have been treated with Stelpro, and also some sections of metal to indicate the depth of penetration under different conditions. Reports of laboratories are included showing, for example, the analysis of a steel spike originally with 0.11 per cent. carbon and after treatment containing 1.78 per cent. The booklet gives directions for packing the steel articles and the infusing powder in containers and covers the time of treatment and the temperature, penetration, quenching and subsequent heat treatment.

The Brown Hoisting Machinery Company, Cleveland, Ohio, has secured a contract from the Fort William Coal Dock Company, Ltd., Fort William, Ontario, for a coal bridge 470 ft. long equipped with a grab bucket and man trolley.

Large Knuckle Joint Press

For performing heavy stamping and embossing operations on steel, brass, copper, silver, britannia metal, etc., the E. W. Bliss Company, 11 Adams street, Brooklyn, N. Y., has recently brought out a new line of knuckle joint presses. The press which is shown in the accompanying engraving is built along different lines and is much larger than anything previously constructed by the company in this class. It is capable of exerting a pressure of 800 tons and is typical of the tendency which has been on the increase during the last few years toward building amply proportioned and great capacity presses. It is pointed out that the reason for this is that the power press enables many articles to be made in this way more economically and uniformly than was possible with the older method.

The employment of knuckle joint principle it is emphasized gives a powerful movement to the slide at the end of the stroke when work is being done with a small amount of friction and power and also provides a slow movement at this point which enables the metal to flow while under pressure as is the case in embossing. The bed



A New Type of Large Knuckle Joint Press Built by the E. W. Bliss Company, Brooklyn, N. Y.

is stationary and the toggle links are placed above the slide and occupy the same position as the pitman in an ordinary crank press and are operated by a crank shaft in the rear. The special features of this construction are that it not only increases the length of the stroke of the slide, but in addition enables positive knockout attachments in the bed and crossbar knockouts in the slide to be employed. The press is of the tie-rod type, the bed and the crown piece being separate castings. The side housings are also separate and are of box section. They receive any side strain and furnish bearing surfaces for the slide and the crank shaft. The four large vertical tie-rods which bind the press together and take the entire strain when the machine is in operation pass through the side housings. It is pointed out that this method of construction prevents breakage of the frame and in addition furnishes a means for releasing the press if it should become stalled on its center. To release the press should this become necessary at any time, openings are provided through which the tie rods can be heated and expanded.

The following table gives a few of the principal dimensions of the press and serves to indicate its size:

Distance between uprights, in.....	28
Stroke of slide, in.....	2
Depth of slide flange, in.....	16
Width of slide flange, in.....	22
Depth of top of bed, in.....	27
Width of top of bed, in.....	34
Total weight of machine, lb.....	45,000

The press is operated by a jaw clutch which has three engaging points and is controlled by a foot treadle at the right of the machine. The adjustments required for various dies and pressures are obtained by a taper wedge adjustment. A hand wheel serves to adjust the wedge by acting on a screw which varies the position of it.

Six-Spindle Boring Machine

For reaming and boring heater sections the Beaman & Smith Company, Providence, R. I., has designed and built a six-spindle machine. It is claimed for this new machine tool that it will do the work both rapidly and satisfactorily as well as with great accuracy. A front view of the machine is given in Fig. 1 and the rear of the machine showing the drive and worm feed is illustrated in Fig. 2.

As will be noticed from the accompanying engraving the machine consists of a platen supporting two uprights and two horizontal beds. There are two adjustable saddles each carrying a spindle mounted upon each upright, while the two remaining spindles are mounted on saddles located one on each horizontal bed. The platen is 6 ft. wide, 10 ft. long and 12 in. high and has a track on which the jig holding the work is rolled into position. To insure continuous operation of the machine two jigs are furnished and in this way it is possible for one to be loaded or unloaded while the other is in the machine. The ends of the crucible steel spindles are finished to fit any type of cutter that may be specified. The two spindles on each upright are driven in unison while the two on the beds are independent of each other. All of the spindles run in hard bronze boxes, the front one being 3 in. in diameter and 6 in. long. The horizontal movement of all the spindles in their respective heads is 11 in. Four speeds ranging from 15½ to 32 r.p.m are available and the feeds are automatic. These range from 1/64 to 1/16 in. per revolution of the spindle and are obtained by employing change gears.

The spindles on each side of the machine are driven independently from those on the opposite one. Two 5-in. belts running on two four-step cone pulleys transmit the power to the spindle through gearing in the ratio of 14 to 1. The diameters of the cone pulley steps vary from 14 to 20 in.

The following table gives the principal dimensions and specifications of the machine:

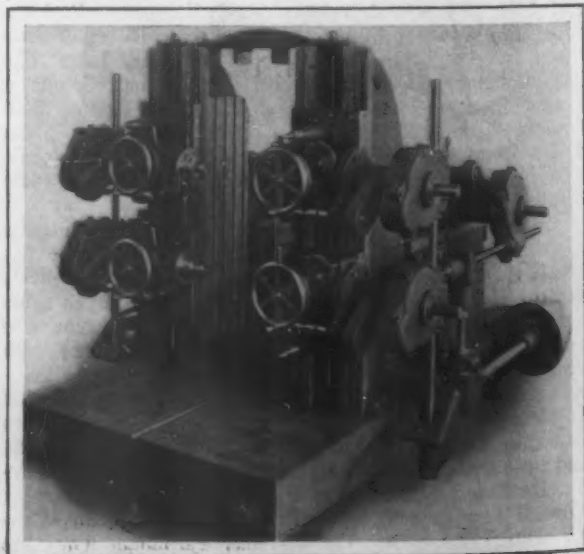


Fig. 1—Front View of a New Six-Spindle Machine for Boring and Reaming Heater Sections Built by the Beaman & Smith Company, Providence, R. I.

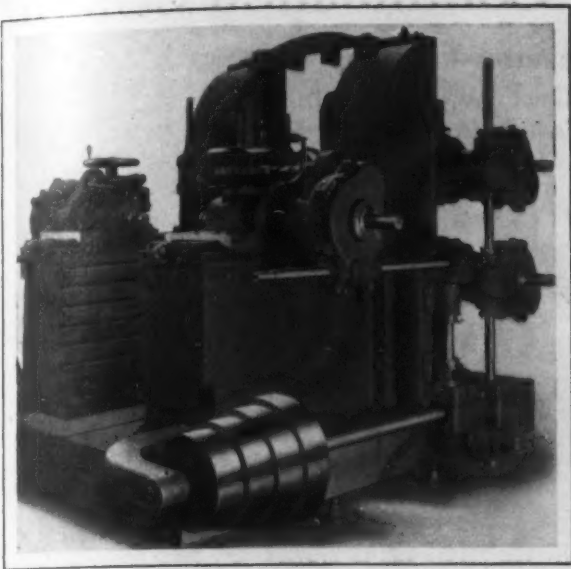


Fig. 2—Rear View Showing Drive and Worm Feed Gears

Distance between uprights, in.....	23½
Minimum distance between centers of spindles on up- rights, in.....	18
Maximum distance between centers of spindles on up- rights, in.....	49
Minimum distance between lower spindle center and top of platen, in.....	15¼
Minimum distance between ends of spindles, in.....	¾
Maximum distance between ends of spindles, in.....	22¾
Minimum distance between centers of spindles, on up- rights and centers of rear spindles, in.....	36
Maximum distance between centers of spindles on up- rights and centers of rear spindles, in.....	62
Distance from center of rear spindle to top of platen, in.....	40¼
Net weight, lb.....	31,000

For driving this machine the builder recommends a countershaft speed of 310 r.p.m. The power from the countershaft should be transmitted by a 7-in. belt running over tight and loose pulleys 14 in. in diameter.

New Electroplating Dynamo

For electrolytic work and also for electroplating the Munning-Loeb Company, Matawan, N. J., has recently brought out a new type of low-voltage dynamo. Fig. 1 is a view of one of the dynamos and serves to give a general idea of the construction of the entire line. A set of test curves for the 24-kw. machine is reproduced in Fig. 2, while Fig. 3 is an end view of the frame showing the separate field windings.

The Optimus dynamo, which is the name given to the new machine, is of the multipolar type, except in the very small sizes, and is compound wound. It is emphasized that the employment of a large number of poles secures a better magnetic distribution and higher efficiency than is pos-

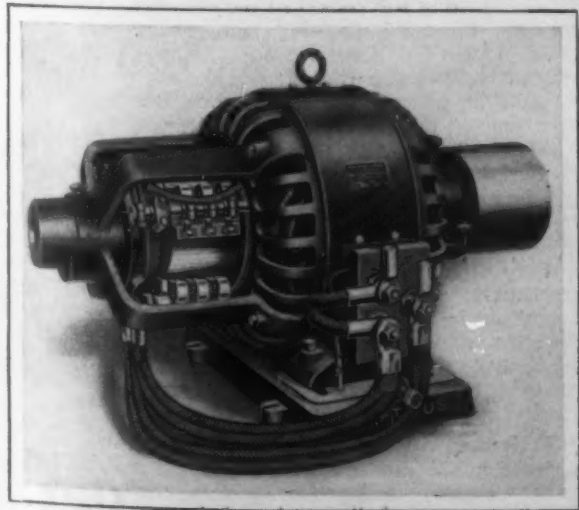


Fig. 1—One of the New Optimus Belt-Driven Electroplating Dynamos Built by the Munning-Loeb Company, Matawan, N. J.

sible with the bipolar type. Fig. 2 shows that the efficiency is high and practically constant over a range of from 50 per cent. load to 25 per cent. overload and the voltage is also constant from no load to 25 per cent. overload.

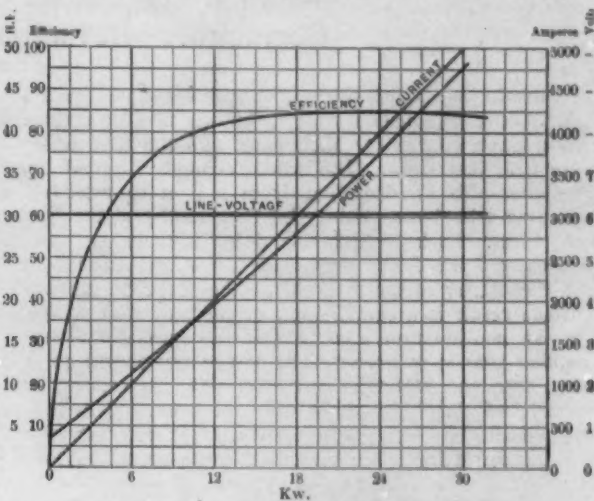


Fig. 2—Test Curves of a 24-Kw. Generator

The voltage is maintained automatically by a special compound winding shown in Fig. 3 and is not secured by any manual shifting of field rheostats. In this way it is possible for the plater to cut different tanks in and out of

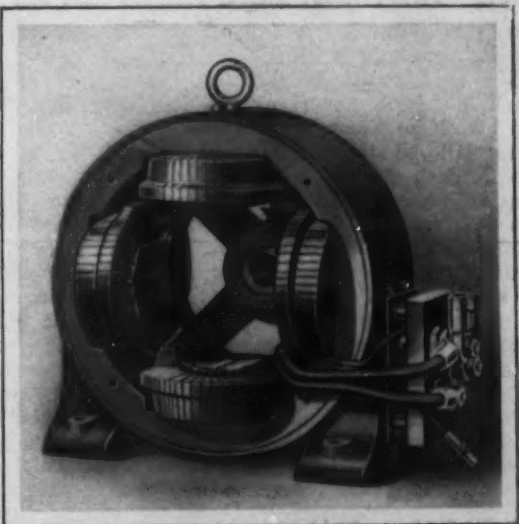


Fig. 3—View of the Frame Showing the Separate Windings for the Series and the Shunt Field

the circuit at will, and at the same time it is emphasized that the edges of the work cannot become burned by short periods of high voltage nor is the work retarded by the slow deposition of metal due to low voltage.

Pennsylvania Industrial Accident Commission.—The five members of the Industrial Accident Commission recently appointed by the Governor of Pennsylvania to investigate and report to the Legislature on methods for the prevention of accidents to workmen in the different industries and to recommend laws providing compensation for workmen injured were in Pittsburgh last week and inspected the appliances for the prevention of accidents in the mills of the Jones & Laughlin Steel Company and of the Carnegie Steel Company. The committee also visited coal mines at Castle Shannon and several industries at Charleroi and Monessen, Pa. On April 10 the commission will hold its first public hearing at Harrisburg.

At the annual meeting of the Lackawanna Steel Company stockholders recently held in Lackawanna, N. Y., the directors whose terms expired this year were re-elected as follows: J. J. Albright, C. Ledyard Blair, Warren Delano, J. G. McCullough, James Speyer, Moses Taylor and Henry Waters.

Hartford Co-operative Continuation School

A Course of Unusual Features for Shop Boys —Employers Select and Pay the Pupils— Compulsory Deviation from Half-Time Plan

Manufacturers and the school authorities of Hartford, Conn., have established what is known as a co-operative continuation course for shop boys, and the first sessions were held last week. The school is along original lines. The course is an evolution from a plan to establish a half-time school comprising the Cincinnati and the Fitchburg ideas. Lack of high school facilities and accommodations compelled the committee of manufacturers who had the matter in hand to curtail the scope of the work, and the result is a combination of the half time with the German continuation school. Of very special interest is the fact that it is proposed to evolve the course as laid down into the half-time principle. The experiment will be watched closely by those who are interested in industrial education. Certain ideas which are inherent to the continuation school will undoubtedly be permitted to remain permanently. The plan as now operating is as follows:

The Pupils of the School

Selected boys and young men, chosen by employers from their works, are sent to the school. In the beginning 75 of the 2000 eligible boys employed in the metal working industries of Hartford will be given this opportunity. Every machinist employer of the city has the right to send one boy. After that the number admitted from one shop is pro rata of the pay roll, or as many as each employer may desire up to that limit.

The student will be paid full wages for the time passed in school, comprising two half days of 4 hours each a week for 9 months of the year, for four years. The classes will be segregated from the rest of the high school. Each student will be advanced according to his progress, regardless of his fellows. The wages of the boys will be docked for tardiness or absence from school according to the rules of their respective shops. No distinction is made between the indentured apprentice and the boy working by the day. Young men graduating from this school who show special ability and promise will be permitted, it is planned, to continue their education, under the same general conditions of employment, in an institution of higher learning.

A point in industrial education which has not been given sufficient prominence, is the difference between sending a boy from a half-time school or similar institution to the shop, and on the other hand the sending of the boy from the shop to the school. Under the latter system the boy has been tried out for his mechanical ability, his industry and his character. The students are selected material. When a boy enters a school and is sent to a shop for a part of his course, he is an unknown quantity. He may prove to be unqualified for a mechanical calling. No hard and fast rule can be laid down, of course, but as a general proposition these statements undoubtedly represent the common experience.

Experience in Other Cities Considered

In some cities difficulties have been met in establishing half-time schools. The shops were not called on to furnish the students and few boys, leaving the grammar schools could be induced to take the course. One attempt, carefully organized by the manufacturers of a large city where iron and steel are the chief industries, failed utterly. Complete arrangements for the classes were made but the number of pupils was so small that the school was never organized. Had the manufacturers selected boys from among their own employees, the school would doubtless have had a full quota and would be an important industrial factor today. To be sure this method does not bring new boys to the shop excepting through indirect influences, but the shop career is made more attractive, and many a skilled man may be created out of lads who are not apprenticed and who otherwise might drift elsewhere to other classes of employment or end their days as unskilled workmen.

The Hartford system places a premium on the industry of its shop boys. The manufacturers in selecting their first representatives in a school, have picked out lads who show mechanical promise and an industrious and clean minded nature. Their shopmates who were not chosen should be envious in the knowledge that they might have been relieved from their routine work and sent to school. Competition should be keen in the effort to be the next selected.

The institution should grow in size rapidly. Hartford is a rich city; its industries are of a high order employing an unusually large percentage of well paid skilled men. Of the boys who leave the grammar schools of the city only 40 per cent. get any further education. A great number of them go to the shops. Under such conditions the city can hardly fail to provide very much more extensive facilities for the education of the budding generation into skilled labor. The Hartford school may, of course, change its policy in recruiting boys. It would be wholly possible to accept students directly from the public schools as well as from the shop. The manufacturers who are taking such warm interest in the course will, of course, await developments. A committee from their number will serve as an advisory board with the school authorities.

The committee of the Manufacturers' Association of Hartford County which has worked hard and diligently in arranging for the new school consists of Charles B. Cook, Royal Typewriter Company; C. D. Rice, Underwood Typewriter Company; B. M. W. Hanson, Pratt & Whitney Company; Harold Pope, Pope Mfg. Company, and President Luther of Trinity College.

Details of the Course

The details of the course as outlined follows:

First Year: English, drawing, mathematics, science, theory of shop practice.

Second Year: English, drawing, mathematics, science, theory of shop practice.

Third Year: English, mathematics, science, accounting and system, theory of shop practice.

Fourth Year: English, accounting and system, civics and economics, industrial history and geography, theory of shop practice.

The English will consist of written reports every two weeks on assigned subjects, usually covering their shop experience and progress, or some domestic or social matter of deep individual concern. The other periods to be devoted to oral reports, explanations and discussions. Spelling, capitalization, punctuation, and the use of words and phrases criticised and corrected. Through this it is believed that the instructor can keep in close personal contact with his pupils.

The drawing will consist of the elements of mechanical drawing, free-hand sketching, and machine design. The object should be to acquire a ready knowledge of blue prints and designs, a free graphic expression of mechanical thought, and the solution of some constructive problems, but not the technique of a draftsman.

The mathematics will review arithmetic, cover enough of algebra to enable pupils to use some of the formulas and data of the engineers' handbooks and of the technical periodicals. The treatment of simple equations and solving for one unknown quantity, and dispelling the fear and mystery of literal equations is all that is hoped. A few problems in constructive geometry, the art of establishing a mathematical proof and in trigonometry the solution of the right triangle by natural sines and tangents, and perhaps a little slide rule practice.

The Consideration Given to Shop Practice

It is assumed that the boys will get their shop experience in the shops, but such standard tools as lathes, planers, shapers, drill presses, millers, grinders, etc., will be taken apart and discussed, and demonstrations cover-

ing a wide range of their uses will be given taking time to explain and discuss the principles involved as well as to show their many operations. In considering such tools as the turret lathe, screw machine and punch press, which are essentially tools of rapid production, classes will be taken by previous arrangements to the shops where that line of work is best exemplified and the work explained by the men in charge of the job, after which in class room the features of such visits will be discussed and digested. Small tools, hardening, and timbering, speeds and feeds, speeding by belt and by gears, spirals, tapers, threads, gauges, and a large range of kindred subjects will be explained, demonstrated and discussed. This course will cover four years, two hours per week. The mathematics and science will be definitely related to the daily work of each boy.

The science will cover, in physics, the elementary mechanical principles, with somewhat of heat and of electricity. In chemistry, the elements of metallurgy and the crystallization of iron and steel, case-hardening, etching, acid cleaning, coloring, etc., etc. In hygiene, when, how, and what to eat; when, how and where to sleep; disease, contagion, care of children, habits and their effect on health and character.

Bookkeeping in simple form, stock accounting and system, domestic accounting and investment will be studied. Civics will comprise municipal government, duties of citizenship, economics and conservation.

The Allis-Chalmers Reorganization Plan

The Reorganization Committee of the Allis-Chalmers Company has agreed that a new corporation is to be organized with \$42,500,000 capital stock, consisting of \$26,000,000 common and \$16,500,000 7 per cent. cumulative preferred. The preferred stock is to be cumulative at the rate of 5 per cent. from January 1, 1913; 6 per cent. from January 1, 1915, and 7 per cent. from January 1, 1917, but to be entitled to 7 per cent. from the beginning if earned.

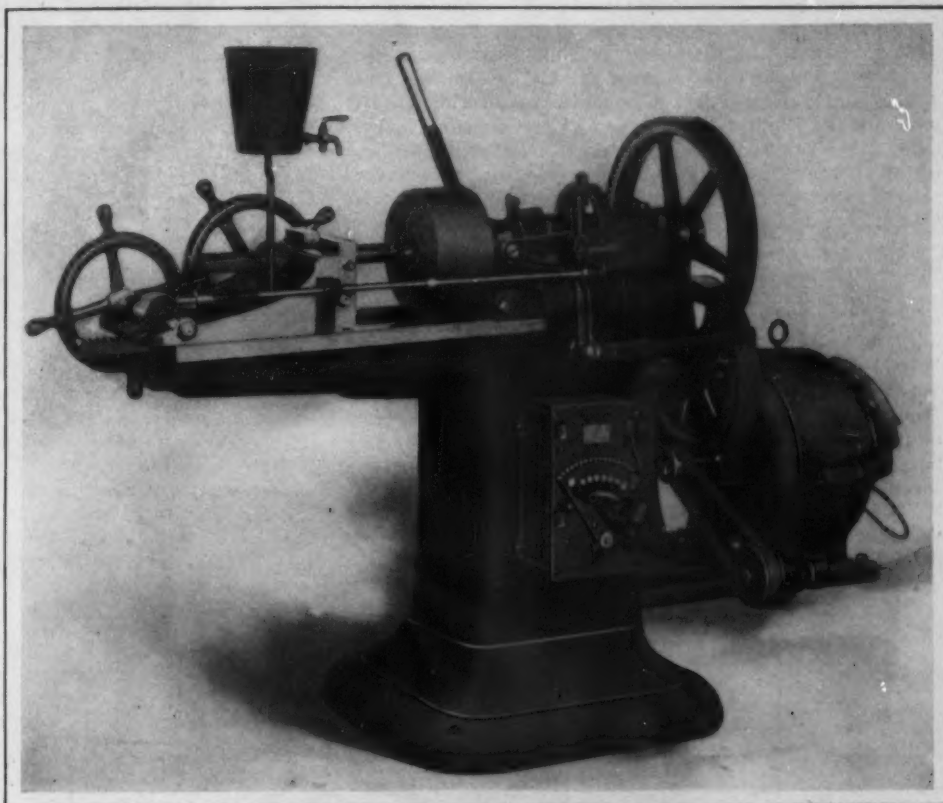
If practicable, the new preferred stock is to have the power to elect a majority of the board of directors and is to be redeemable at 110. A voting trust of new preferred and common stock is to be created for five years with five voting trustees, to be appointed by the Reorganization Committee.

The assessment of \$20 per share on the present preferred stock and \$10 on the common and the exchange of bonds for stock will work out as follows to present security holders: For each \$1,000 bond a total value of \$1,375, comprising \$1,000 new preferred, \$350 new common and \$25 coupon January 1 in cash; for each \$100 par preferred stock, upon payment of \$20 in cash, a total value of \$110, of which \$20 will be new preferred and \$90 new common; for each \$100 par value of common stock, upon payment of \$10 in cash, a total value of \$45, of which \$10 will be in new preferred stock and \$35 in new common stock.

To carry out the plan, a receiver will have to be obtained, but will probably not be asked for until April 3, at which time the 90 days' grace expires. The reorganization plan was formulated by the bondholders.

Brown Motor-Driven Bolt Cutter

The motor-driven bolt cutter shown in the accompanying engraving is one of two types which have been recently brought out by the H. G. Brown Company, East Hampton, Conn. The smaller of these machines is de-



The New No. 2 Motor-Driven Bolt Cutter with Automatic Attachment and Oil Pump Built by the H. G. Brown Company, East Hampton, Conn.

signed for handling stock up to a maximum diameter of $\frac{3}{4}$ in., while the capacity of the larger size which is the one illustrated is just double. The $\frac{3}{4}$ -in. size is intended for rapid work on small sizes of iron up to a maximum diameter of $\frac{3}{4}$ in. and will cut either right or left-hand threads. It is constructed without gearing and possesses sufficient power for any work within its range. The spindle is hollow, an arrangement which enables bolts of any desired length to be threaded. In addition to cutting bolts the machine will thread pipe up to a maximum diameter of 1 in. The larger machine which is illustrated will cut either right or left-hand threads on bolts of any length ranging from $\frac{3}{8}$ to $1\frac{1}{2}$ in. in diameter. This machine is equipped with gears, the ratio being 5 to 1.

In this type of bolt cutter the thread is cut by four dies which are fixed in the head upon the hollow shaft. The dies revolve around the bolt which is held stationary in a vise controlled by a right and left-hand screw on the shaft of the small hand wheel. It is pointed out that this arrangement is more convenient especially when handling long bolts than the revolution of the work. The dies have their bearings upon the hardened steel rim that surrounds the die bed, thus making them essentially a solid die. They pass over the bolt but once and when the thread has been cut they are opened by moving a lever. The bolt is withdrawn, but the machine is not stopped and continues in motion until another piece is inserted. The machine will cut V, square or ratchet threads with equal facility and if desired it can be used for tapping nuts, the time required to change the machine from one class to the other being a matter of only a few moments.

A bill has been reported favorably by a committee of the Massachusetts Legislature amending the strike advertising law by providing that during the continuance of an illegal strike it shall not be necessary for the employer seeking help to advertise that there is a strike, or after a shop in which there has been a strike is again working on a normal basis.

Using Gas Fuel in Fan System Heating

Apparatus Installed for Utilizing Natural, Producer or Blast Furnace Gas and Designed for Direct Use, When Necessary, of Coal or Oil

A gas heater for use in connection with the fan system of heating and ventilating was designed several years ago by the Buffalo Forge Company's engineering department for the Phillips Sheet & Tin Plate Company, Clarksburg, W. Va. About one year later another heater was installed for the same company, the first one having proved satisfactory. The Buffalo Forge Company has now arranged to make the heaters so that oil or coal can also be burned in them if the gas supply, such as natural gas, should ever give out.

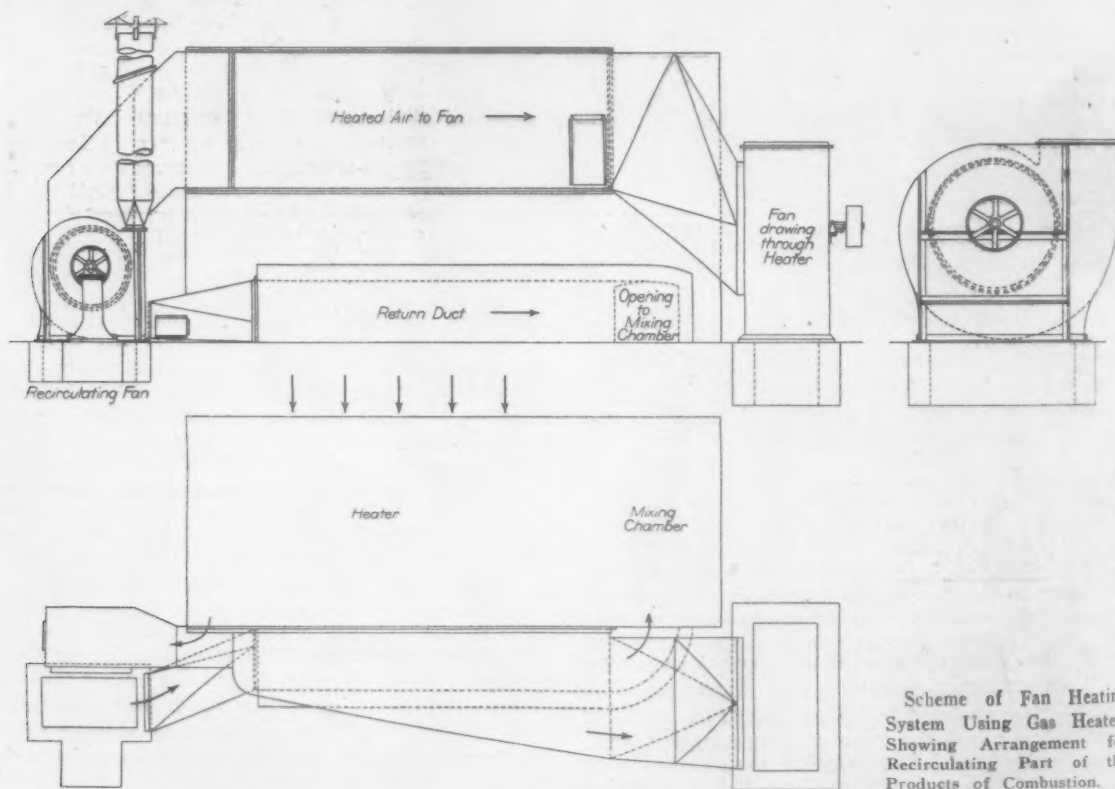
The heaters are similar in construction to a water-tube boiler. The gas is supplied to long narrow open burners at a pressure of about 8 oz. After the gas is burned the resulting hot gases are baffled to the back of the heater, where they are mixed with the return gases from the cold end of the heater. The temperature of this mixture, it is explained, is low enough to prevent any possibility of burning out the number of boiler tubes through which it has to pass.

The fresh air for the heating system passes around the tubes, absorbing the heat. The gases, after passing through the horizontal tubes, pass into a small chamber at

Another installation was recently completed for the Hazel Atlas Glass Company at Wheeling, W. Va., and an idea of its proportions and general appearance may be gained from the accompanying reproduction of a photograph. This system includes one double-width Conoidal fan for supplying fresh air to be heated and another Conoidal fan for recirculating the hot gases. The heater itself is of the Buffalo vertical blow-through type in which is incorporated an automatic booster system for supplying the air necessary for combustion of the gas. The fans are driven by shunt motors.

In the heater the tubes are arranged vertically in staggered rows to bring the air to be heated into immediate contact with the hot tube surface. The tubes are 4-in. wrought iron expanded at the ends into heavy tube sheets. The bottom is at the floor level. The air to be heated is blown over the tubes at a low velocity.

The three burners are of cast iron, about 8 ft. long, with rectangular slots in the top, through which the gas and air mixture escapes to be burned. Mounted on these burners is a brick wall, over which the hot gases must pass. These baffle walls are provided to get perfect com-



the front end of the heater. Even after passing through the tubes, the gas is rather warm (750 deg. F.) and half of it is therefore recirculated to serve the double purpose of saving heat and cooling off the gases at the entrance to the boiler tubes so that the danger of burning out the tubes is avoided. The recirculation is accomplished by a small double discharge exhauster.

The American Rolling Mills at Middletown, Ohio, have recently ordered a large heating installation, including two Buffalo gas heaters, two 130-in. Conoidal fans and galvanized iron air ducts. The heater will have gas burners, coal grate and the horizontal tubes. The grate is arranged so that gas, coal or oil may be used for fuel. If the gas ever gives out and coal is used, the resulting efficiency, it is expected, will be 80 per cent. under the heater, which is regarded as 20 to 30 per cent. better than could be obtained by burning coal under boilers.

Combustion of the gases before being mixed with the recirculated gases. The burners are in a pit below the bottom tube sheet and are at a distance from the tubes to prevent the hot gases from coming in immediate contact with the tubes, a condition which would be injurious. The burners are under only one-half the tubes, this allowing the hot gases to be sucked up through half the tubes and down through the other half to secure a maximum absorption of the available heat.

The gas pressure in the particular locality is low and varies from 3 to 6 oz. To avoid large and cumbersome burners which would otherwise be required with gas at low pressures an automatic forced-draft system was provided for supplying the fresh air for combustion. This forced-draft system consists of a small electrically driven blower which supplies the fresh air to the jets at the same pressure as that of the gas. At the point where the air



View of Gas Heater Installed for the Hazel Atlas Glass Company, Wheeling, W. Va.

and gases are mixed to the correct degree for proper combustion the pressure of the gas and the volume of air are proportioned by means of an automatically operated damper.

The system is reported to be giving satisfaction and requires the attention of only one man for a few minutes each day to start and stop the motors and light the fire. There are no ashes or coal to be handled and the cost of operation, it is felt, is therefore practically nothing more than the cost of the gas, which is cheaper than steam.

Cost and Selling Price of Castings

"Estimating the Selling Price of Castings" was the subject of an address delivered by A. O. Backert, editor of the Foundry, before the Chicago Foundrymen's Club at its monthly meeting held at the Great Northern hotel Saturday evening, March 16. Attention was directed to the adoption of an intelligent system of estimating, particularly in jobbing shops, where a varied line of work is made. The following formula was recommended for use in making estimates, which includes all of the factors entering into the cost of making castings:

$$W + L + O + C + P = \text{selling price.}$$

It was explained that the cost of the metal in the casting is represented by W, which is the weight of the casting multiplied by the unit cost of the metal in the ladle; L represents all direct labor, including molding and coremaking; O, the overhead charges which in many instances will be found to exceed greatly the cost of the direct labor; C, contingencies, a factor which always should be carefully considered when making estimates on castings. This should include possible casting losses, special rigging, etc. The profit is represented by P. The establishment of an estimating school was recommended for the purpose of training the foundrymen, superintendents, foremen and other foundry employees to make estimates intelligently and to eliminate, as far as possible, the large amount of guesswork which is one of the evils of the jobbing foundry industry.

A Gigantic Steam Turbine.—The Brooklyn Rapid Transit Company has placed an order with the Westinghouse Machine Company, Pittsburgh, for a gigantic steam turbine. It is to be capable of delivering a continuous output of 20,000 kw., corresponding to 30,000 hp., and will be able to carry a load of 35,000 hp. as a maximum. In type it will be of the Westinghouse double flow construction, and in general outline will resemble the 10,000 kw. turbine built for the City Electric Company, San Francisco, and which attracted the world-wide attention of engineers as having developed the highest thermo-dynamic efficiency on record, either in this country or abroad.

McNab Direction Indicator

To provide a means for indicating the direction and speed of rotation of an engine, the McNab Company, Bridgeport, Conn., has brought out a new device. This not only shows the direction of rotation and number of revolutions of the engine, but also shows the last order given to the engineer.

In operation the direction of rotation is shown by having the small pistons corresponding to the direction of motion rise and fall in unison with the speed of the engine. This is accomplished by compressed air, the pressure being communicated from the engine to the indicator by a system of pipes. In the type of indicator



A New Type of Indicator for Showing the Direction of Rotation of an Engine Made by the McNab Company, Bridgeport, Conn.

shown the last order given is shown in an opening in the upper part of the device, while the two colored lamps flash at each revolution according to the direction and speed at which the engine is moving. These lamps can be connected to dry cells or the regular lighting circuit of the vessel, as may be preferred. Provision is also made for disconnecting the flash system whenever desired. In addition to the type of indicator illustrated the device is also made without the lights and without the indication for the last order, or, if desired, it can be supplied with counters for recording the number of revolutions of the engine in either direction.

The American Locomotive Company's Better Business.—The last four or five weeks have witnessed a very encouraging improvement in orders and basis of operations of the American Locomotive Company. For the first time in two years its plants are now operating at better than 50 per cent. of capacity. It will be recalled that at one time last summer operations got down as low as 25 per cent. of capacity and at the close of 1911 operations were hardly 40 per cent. of normal. During 1911 the company booked orders for about 950 locomotives, compared with a full capacity of between 3300 and 3500 annually. This was perhaps the leanest year for new business that any big equipment company had ever been called upon to face. In the 10 weeks since January 1 the company has had about 400 locomotive orders and has business enough on its books to keep running as it is until June 30.

A receiver has been appointed for the Portsmouth Machine & Casting Company, Portsmouth, Ohio, whose property is valued at \$50,000. The plant will be advertised for sale and the date of the sale will be about May 15.

The Proposed National Eight-Hour Law

More Protests Against the Bill to Limit the Labor of Mechanics and Others Employed on Government Work to Eight Hours a Day

Additional abstracts are herewith given of the testimony that has been presented to the Senate Committee on Education and Labor against the bill prohibiting mechanics and others engaged on Government work from being employed more than eight hours a day. In every case those who appeared—and they were all representatives of large manufacturing interests or of manufacturers' associations—opposed the bill as being detrimental to the interests of both the working man and the employer.

Testimony of Wallace Downey, President Downey Shipyard & Marine Company, New York City

MR. DOWNEY. I come here especially representing the National Metal Trades Association and also the National Association of Manufacturers. In the National Metal Trades Association there are about 750 concerns, employing approximately 215,000 work people. In the National Association of Manufacturers there are approximately 3500 manufacturing concerns, representing the employment of about 1,500,000 persons throughout the United States.

These associations are the two great national industrial organizations of the United States, and their interest in this matter of an eight-hour law is gigantic. Really their interest is the interest of the country at large. They have asked me to say to you emphatically that they are opposed to the enactment of this proposition into a law so that it will become a part of our manufacturing policy. We object to it because it will increase the manufacturing cost in the United States from 20 to 30 per cent. generally, and upon Government work, to which it is intended specifically to apply, it will increase the manufacturing cost approximately 50 per cent.

THE CHAIRMAN. Is it a legitimate argument to say that it will cost the Government a little more if the physical, intellectual and moral well being of the laboring men should require that a change be made?

MR. DOWNEY. I am speaking largely from experience. I served my apprenticeship in the shops. I worked as a mechanic and became an employer and investor in business. So I am not speaking upon theory at all as to how the people are affected. I, also, am heartily in favor of organized labor. The intelligent legitimate organization of labor is just as necessary in this country as organized finance or organized religion or organized government, for that matter. The more thoroughly and intelligently organized labor becomes the better the conditions will become in this country for everybody involved.

I have no doubt there are many employers of labor who would bitterly oppose my statement in regard to labor organizations. A great many are opposed to them and a great many are in favor of them. Those are my personal convictions based on my experience as a workman and an employer. Behind this eight-hour bill there is the definite purpose by injecting an eight-hour system into the Government to expand it into manufacturing generally, and logically this would be the result. If the Government goes to a certain policy in all its gigantic requirements the country generally will drift to that same policy.

MANUAL LABOR AND OVERTIME

If a man had said 25 years ago that the work of the mechanic was very difficult and straining upon his physical and mental condition he would have been very much right. Thirty years ago, when I went into the lines of apprenticeship, manual labor was a great part of our manufacturing process. It was a matter of sweat and muscle very largely. That day has gone by, and the manufacturing that has really been talked about here is machine manufacturing. The tens of thousands of mechanics now standing alongside these magnificent machines are not laboring hard physically or mentally. The great mass of people this bill will effect walk into a shop in the morning, go to a ma-

chine and they set a piece in the machine and the machine does the work. They stand and watch the work until it is done to a beautiful nicety. There is no labor about it; it is a mental proposition largely. I have been delighted to work overtime when I was getting \$4 or \$5 a week and had an opportunity to earn \$2 or \$3 additionally. It was a godsend to me and it is a godsend to tens of thousands who are working.

SENATOR MCLEAN. Suppose the bill were amended so as to allow overtime?

MR. DOWNEY. It would be infinitely better. If I was submitting an argument and speaking in favor of an eight-hour bill I would ask you to strike out the part that objects to overtime. I am working today in New York under the eight-hour system. Our men take away an average wage for the week on straight time of about \$18. The average payroll is \$30 a week. The difference between \$18 and \$30 is a wonderful difference to the family. While the men are ostensibly getting \$18 a week, their overtime is constantly running. I have seen our men take out \$60 a week lots of times. This Government work comes into that yard sometimes. If this bill is passed these men would be stopped from that. If we were to say to them, "Here is a bill that we propose to pass which says you shall not be permitted to work more than eight hours a day and not make any overtime," I believe that we would be mobbed out of the yard. It would be striking at the roots of the men's income.

Paul Dillingham Carpenter, Milwaukee, Wis.

I will submit a few remarks at the request of the Western or Chicago office of the National Founders' Association and at the particular request of the Milwaukee Metal Trades and Founders' Association, a local organization, that embraces most of the manufacturers in those lines in Milwaukee. Although these may not be the shops that have made Milwaukee famous, they have at least made Milwaukee prosperous. We are told that the eight-hour day is surely coming, and that may very likely be the fact. When it comes and where it comes, we will try to accommodate ourselves to it. But we would like very much if it could come by evolution rather than be forced and hurried by legislation. Of course, when the eight-hour day comes it will very much increase the cost of living because it will reach every possible walk and department of life. Cutting the day from ten to eight hours will increase the expense of the manufacturers because the overhead expenses will go on. These include every expense except the payroll; that is to say, interest on the bonded indebtedness, interest on the money borrowed, interest on the capital invested, depreciation, salary, taxes and everything except the mere payroll.

The railroad repairs will necessarily increase the cost of transportation; increase the cost of carrying the goods from the farmer or manufacturer, from the merchant to the consumer. The consumer will have to pay for it. The machinery for making cloth will cost more on an eight-hour basis; the machinery for cutting and lowering coal. These things will increase the cost of living. We talk a great deal about business being bad, but business is as good as it was five or six years ago in our part of the country. But we have overdeveloped our factories and are constantly engaged in an effort to fill the empty spaces with work.

We get a great deal of work from Europe. We are able to compete with Europe because we get more work out of our men, partly owing to the greater efficiency of the men and partly owing to superior machinery. The English idea seems to be to take a piece of machinery and nurse it along and make it live as long as possible. The American idea seems to be, in plain English, to rip the insides out of it, throw it into the scrap heap and buy a new machine. If we are reduced to an eight-hour basis the

competition with Europe will become more difficult. It takes off 20 per cent. from our present energy and we need everything that we have. These remarks apply, of course, to the eight-hour day when it comes as a universal proposition. It is impossible to apply the eight-hour day to Government contracts. We cannot work a shop partly on the eight-hour basis and partly on the ten-hour basis.

John Satterthwaite, Remington Machine Company,
Wilmington, Del.

I heard you ask the question, Mr. Chairman, of some of the gentlemen who have preceded me, whether, if this bill passed, it would cut off their work with the Government. I say very frankly that, so far as the Remington Machine Company is concerned, it would do that very thing. This is not a threat, but a simple statement of facts. It would so cut down our profits that, compared with our competitors who are working on a ten-hour basis, we would not be able to do any business. Our foreign trade would be gobbled up entirely, no doubt, by our German and English friends, who are our principal competitors in South America and Central America. Our foremen and sub-foremen tell us our workmen are glad to have a chance to work extra. I know some men who work nights and Sundays when they have an opportunity, because they want to make as much money as they can. The big money is made by doing a large volume of business and turning the capital over and over again. If we did not turn our capital repeatedly and make small profits we would not be able to get along. Because a man or corporation makes \$1,000,000 it does not show necessarily that he is making an abnormal profit. He is merely doing a large amount of business.

Sterling H. Thomas, Pusey & Jones Company, Wilmington, Del.

If you should pass this bill we would have to cut our Government work or else cut out our export trade. We have today inquiries from two Italian concerns, four French, three or four Russian, several Scandinavian, two or three English, and if we are to decrease our hours of labor, and therefore decrease our efficiency, in order to take Government work, we have got to sacrifice that other kind of business. We are asked what the American manufacturer does for his employees. He does more than they do in Europe. We in Wilmington are saturated with the idea of sharing some of our profits with the employees. We are fixing up places of comfort for our women employees, establishing rest-rooms for our stenographers and women and putting in good drinking water in good drinking fountains. We are doing all sorts of little things for their comfort and convenience. We are the friends of our people and our people are our friends. They do not want anything that is not good for us because they recognize that what is not good for us is not good for them. Our interests are identical, absolutely so. What is good for the manufacturer in Wilmington is good for his employees and what is good for the men is good for the manufacturer and what is not good for either one is good for neither.

Samuel K. Smith, Harlan & Hollingsworth Company,
Wilmington, Del.

We have been building a great many modern boilers for the Government, and if this bill becomes a law we will have to put ourselves on an eight-hour basis or cut out the Government work. We are in very close competition with Great Britain and Belgium and Holland on passenger cars that go into Brazil and the Argentine. Last year we shipped out passenger cars at a contract price of about \$700,000 or \$750,000 and were competing directly against the English. I do not know exactly where we would stand, but the probabilities are that we would have to take an hour off and pay the same rate for an eight-hour day that we now pay for nine hours. It might cut us right out of that business. The competition is very close. Of course, we are naturally opposed to the bill for this reason.

Henry Whiteley, McCullough Iron Company, Wilmington, Del.

I have not polled our men and I do not know individually how they would feel, but I venture to say from my

knowledge of them that they would be absolutely opposed to this bill if it means that they must be reduced to an eight-hour day. If a committee is appointed to consider this subject and three of its members should represent labor, labor should be represented on both sides—by labor union men and non-labor union men.

J. E. Walker, Wilmington Malleable Iron Company,
Wilmington, Del.

Our molders, as a rule, work ten hours a day except on Saturday, which is a half day. Hours begin at 7 o'clock in the morning. I venture to say that 90 per cent. of our molders are at work at that hour of their own free will, and if they know we are busy at least 50 per cent. of them will come at 6 o'clock in the morning of their own free will not that we ask them to do so, but to make that extra money which makes homes for them.

Rodney Thayer, Baldt Steel Company, Wilmington, Del.

I am in the open-hearth steel casting business. We make castings for the Navy Department in the shape of gun carriages. We make also castings for the battleships at the various yards. About 10 per cent. of our business goes to the Government either directly or indirectly. We operate our foundry on two shifts. Even if the physical end could be accomplished by any human ingenuity it would increase our labor in the foundry from two shifts to three; that is, it would increase it 50 per cent. The total cost for a given production would thus be heavily increased. There is no 20 per cent. profit in the steel casting business and there has not been for 10 years. Consequently we have only two alternatives—to cut out Government work or to go broke. We do not propose to go broke.

A. M. Campbell (Cast Iron Pipe), Lynchburg, Va.

If I could notify my machine shop foreman that, beginning next Monday, we were going to run our machine shop time and a quarter all those men that have moved away would come back to Lynchburg and go to work. Our men working on an hourly basis voluntarily petitioned me a short time ago to change the working hours. They were working from 7 o'clock in the morning to 6 in the evening, with three-quarters of an hour for dinner. They asked me to cut that lunch hour down to 20 minutes because they did not want three-quarters of an hour to eat lunch in and they would make the same number of hours in the week and would get out at 5.30 as that was all the holiday they wanted.

C. Edwin Michael, President Virginia Bridge & Iron Company, Roanoke, Va.

If I believed economic conditions demanded this legislation in the interest of labor at large, I would advocate the passage of the bill rather than oppose it. The practical application of this eight-hour bill would mean in my business that we would not attempt to compete for Government work, because all the units of our works are necessary, at some stage of manufacture to be employed in the fabrication of structural steel or bridges for the Government. It would be absolutely impracticable to limit the operation of our works to eight hours under present competitive conditions, as such effort would disorganize organization, system and equipment to such an extent as to make it an unprofitable if not an impossible condition.

Charles A. McCormick, of Johnson & Johnson, New Brunswick, N. J.

We manufacture surgical dressings, medicinal plasters, and such other hospital supplies as are used by the Government and by the hospitals throughout the United States and the world. The percentage of our business with the Government varies from year to year. In war times it has gone as high as five per cent. In our business in particular, whether in war times or not time is the great factor; that is time of delivery of goods. To cite you an instance we were called upon by the Navy Department to supply \$18,000 worth of goods and to deliver them from our factory in New Brunswick to the navy yard within 48 hours and we accomplished the contract. If we were limited to the eight-hour feature we could not make the time.

John M. Glenn, Secretary Illinois Manufacturers' Association

Can the industries stand for an eight-hour day? The people who advocate this measure will tell you yes, and the men who will furnish the money and build the plants and take the risk and carry the financial burden will tell you no. All must admit that if we reduce the hours of labor and pay the same wages we must increase the price of the product, and when we increase the price of the product we increase the cost of living, and the cost of living, it is now contended, is out of all proportion to the remuneration which the wage earners of this country receive. A shorter day will increase the interest charges of a plant, will force the increase of the investment, will increase maintenance charges and will increase the payroll. All this increase adds to the cost of living.

Alfred H. Mulliken, Pettibone, Mulliken & Co., Chicago

Labor loses and never gains by an eight-hour day. It is just as impossible for a labor union in this country to get something for nothing as it is for any one else. If the hours of labor are shortened, the cost is increased, and labor is the largest consumer that we have. Labor must necessarily pay that increased cost. Besides, anything that tends to diminish the foreign trade of this country diminishes the amount of trade to be done in this country. Therefore labor is injured by an eight-hour day. Why should we have an eight-hour day? The reply is that eight hours is shorter than ten hours; therefore it is a good thing. If it is a good thing, then why not make it four hours? Four hours are better than eight hours. Why not make it no hours at all? Then you would have the best of the whole thing. Where would we be then? We would go back to the stone age and become barbarians.

This country is supposed to be a land of liberty. If I wanted to work 16 hours, it should be nobody's business but my own. I should have the right to work as many hours as I pleased, as long as I did not interfere with the rights of my fellow men. This bill is an entering wedge and should be stopped in the interest of labor as well as in the interest of the whole country. Therefore, as voters and citizens of the United States, we object to this bill because it already increases the high cost of living; because it is class legislation, and places unnecessary burdens upon business generally.

A New Safety Speed Limit Stop

The Norwalk Iron Works Company's Device for Steam Engines and Air Compressors, Where Speed Variations Are Wide

For use where there are constant and unusual variations in speed, due to fluctuations in the demand for air, the Norwalk Iron Works Company, South Norwalk, Conn., has brought out a safety speed limit stop. This device was designed by the company to take the place of the regular type of speed limit governor employed on a factory engine which moves through a limited range because the speed is practically uniform and therefore does not serve the purpose required on a compressor. The stop is intended for operation only when the emergency arises or when a test is being made. Fig. 1 is a view of the new device, while details of its construction are shown in Fig. 2.

As will be seen by referring to Fig. 2 a sliding bolt, *a*, is concealed in the rim of the flywheel, being held in place by a spring, the tension of which has been actually calculated. So long as the wheel revolves at a speed below the predetermined limit, the bolt and the spring do not move and are thus subjected to no wear. When the speed limit is reached the bolt is forced out by the action of centrifugal force and as the wheel revolves touches a trigger, *b*, which opens a small steam valve through the action of the auxiliary trigger *c*. The opening of this valve permits steam to enter the cylinder *d* and the pressure working upon a piston causes the throttle in the main steam pipe *e* to be closed. For testing purposes the trigger on the small steam valve can be operated by hand or if desired a wire can be carried from the compressor to any remote point so that it can be stopped at a distance.

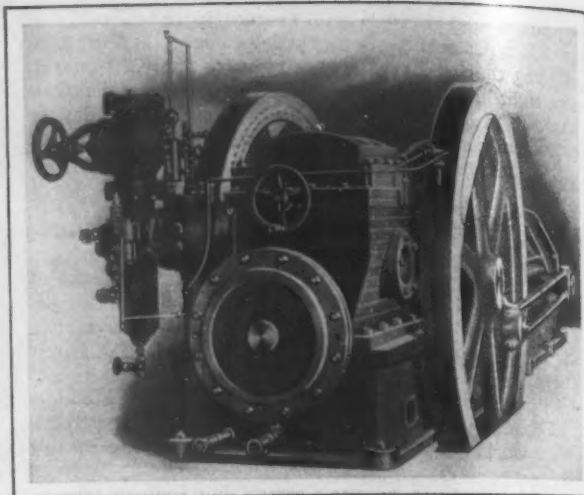


Fig. 1—A New Device for Controlling the Speed of Steam Engines and Air Compressors Where the Variations are Wide and Constant Built by the Norwalk Iron Works Company, South Norwalk, Conn.

Pittsburgh Railroads and Industries

The National Tube Company, Pittsburgh, Pa., has issued a map of the Pittsburgh district showing the railroad terminals and the location of the iron and steel works having track connections. The size of the map is 24 x 37 in. The various works are indicated on the map by numbers, and a list of the works is printed on the margin of the sheet with the numbers attached so that their locations can easily be ascertained. This list of works is given both numerically and alphabetically for the purpose of making easy reference. The various railroad lines are so indicated as to be easy of identification. The map reflects great credit on the traffic department of the company.

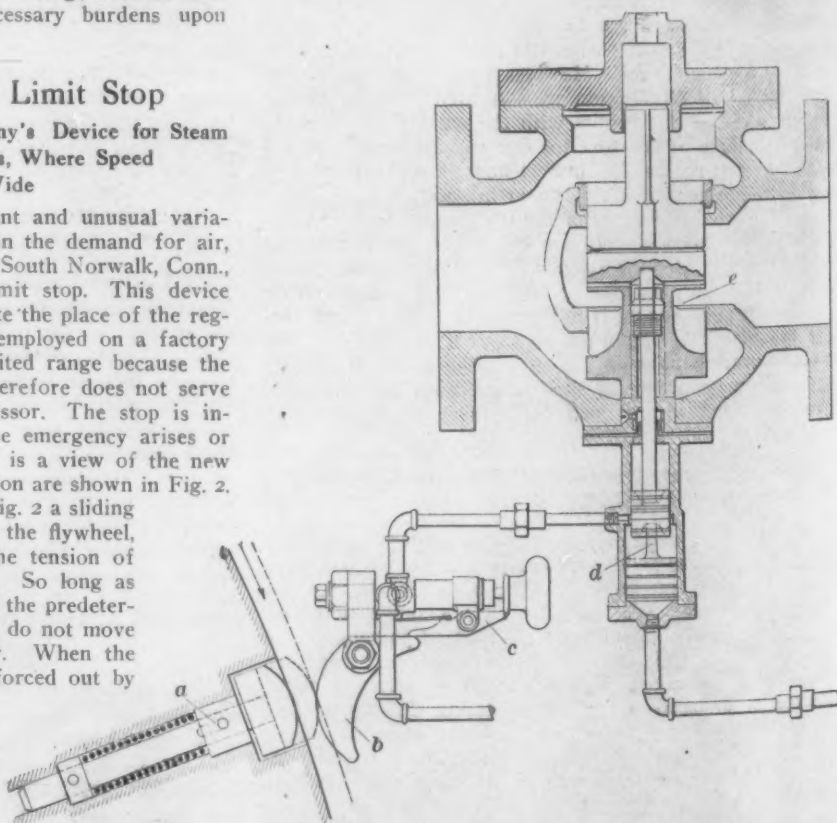


Fig. 2—View Showing Constructional Details

It will be found highly valuable by those who desire to know by what railroad a particular plant is reached. The map is a most impressive exhibit of the industrial importance of Pittsburgh and its environs.

German and American Steel

A Comparison of Stern Frame Castings for the Atlantic Liner Princess Irene

BY E. F. CONE

In *The Iron Age* of June 29, 1911, an account was published of the work done by a large steel foundry in Pennsylvania in replacing the broken stern frame of the North German Lloyd steamer Princess Irene. It was the good fortune of the writer to secure some pieces of the original stern frame for comparative tests, the results of which are given below.

The original stern frame was cast in Bohemia and was made in two sections, designated for convenience, A and B. The chemical analyses of these sections were:

	Section A. Per cent.	Section B. Per cent.
Carbon	0.35	0.45
Manganese	0.70	0.70
Silicon	0.277	0.333
Sulphur	0.060	0.061
Phosphorus	0.062	0.070

This is either Bessemer steel or a poor grade of acid open hearth and is by far inferior to the grade of steel incorporated in similar castings in this country. The stern frame to replace this broken one was made in three sections, designated as C, D,

	Section C.	Section D.	Section E.
Tensile strength	68,380 lb.	67,400 lb.	67,220 lb.
Elastic limit	36,930 lb.	36,930 lb.	32,940 lb.
Elong. in 4-in.	29.25 per cent.	26 per cent.	28 per cent.
Reduction of area....	41.9 per cent.	42.4 per cent.	47.9 per cent.
Fracture	Silky cup	Silky cup	Silky cup
Bend 1 in. x 1 3/16 in..	180° Cold	180° Cold	180° Cold

These tests reveal a superior ductility and elasticity as well as a softer steel, less liable to break under severe strains.

Under the microscope there does not appear to be a vital difference between the German and American cast steel. Figs. 1 and 2 represent the microstructure of the A and B sections of the German steel and Figs. 3, 4 and 5 that of the domestic steel. From these, it is evident that the method of annealing followed there is the same as used here; namely, bringing the castings to the recalcence point, holding them there until there is a readjustment of the structure and then allowing them to cool slowly in the closed annealer. The microphotographs of the German steel reveal the presence of more oxides, slag, etc., than appear in the American product and the consequence was a weaker and inferior steel.

It was stated to the writer by an experienced German engineer at the time these castings were made that their experience with cast steel in German vessels, those of large tonnage in particular, was the great tendency of the German steel to break in service under

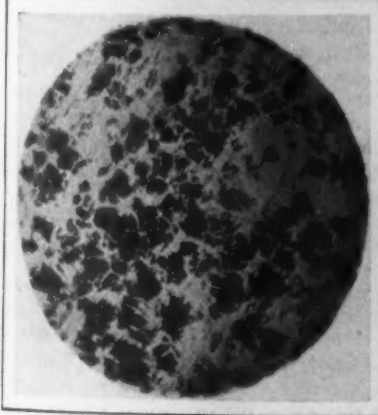
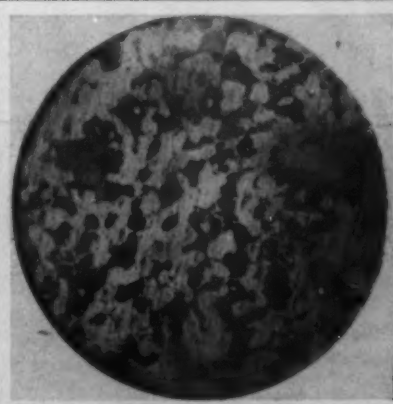
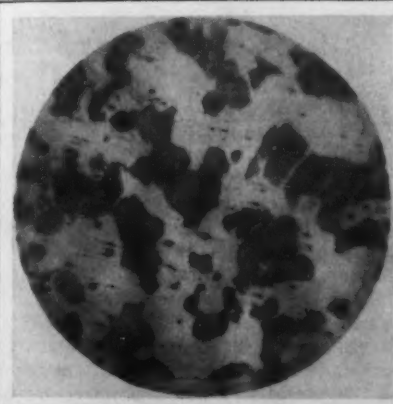


Fig. 3—Section C Fig. 1—Section A Fig. 4—Section D Fig. 2—Section B Fig. 5—Section E
Magnification in Fig. 1, About 70 Diameters; in all Others, About 55

and E, and analyzed as follows:

	Section C. Per cent.	Section D. Per cent.	Section E. Per cent.
Carbon	0.28	0.29	0.27
Manganese	0.61	0.63	0.63
Silicon	0.296	0.256	0.289
Sulphur	0.037	0.037	0.038
Phosphorus	0.031	0.030	0.031

This steel is acid open hearth, and the above analyses represent the average product made by our domestic foundries. The superiority of the material made in this country is evident.

Comparing the two grades of steel as to static properties, the domestic easily surpasses the foreign. The physical tests on the German stern frame sections were:

	Section A.	Section B.
Tensile strength	71,500 lb.	79,000 lb.
Elastic limit	29,000 lb.	37,000 lb.
Elong. in 2 in.	23.5 per cent.	20 per cent.
Reduction of area....	36 per cent.	21 per cent.
Fracture	Silky irr.	Granular
Bend, 1 x 1/2 in.	130° Cold.	80° Cold.

The physical tests on the domestic steel showed the following:

strain; that in very many cases these stern frames, rudders, etc., had been replaced by forgings which usually stood up all right. It is a well-known fact that practically all of our battleships and large vessels are equipped with cast-steel stern frames and rudders, and the failure of any of these castings is rare.

The Cambria Steel Company's stockholders, at their annual meeting, held in Philadelphia, re-elected the retiring directors. The officers are as follows: President, Charles S. Price; vice-president, Alexander P. Robinson; treasurer and assistant secretary, Edward T. Stuart; secretary, D. Brewer Gehly; assistant treasurer, Louis D. Kruse. The directors whose terms expired and who were re-elected are Powell Stackhouse, R. Francis Wood and Charles S. Price. The remainder of the board consists of George F. Baer, Theodore N. Ely, Frederick Krebs, Effingham B. Morris, Edward T. Stotesbury and William H. Donner. The annual meeting of the Cambria Iron Company was also held and the retiring officers and directors were re-elected.

Anti-Piping Thermit for Ingots

The issue of *Stahl und Eisen* of February 22, 1912, contains an interesting article by Dr. Ing. C. Canaris, of Angerort, near Duisburg, Germany, which treats of the use of anti-piping thermit in improving the quality of steel ingots. Its use has been found to reduce such defects in the steel as (1) shrinking holes and piping, (2) injurious segregation in the top of the ingot and (3) large blowholes; the number of small blowholes is diminished and the resulting steel is made much denser. Extracts from the article are herewith presented.

The process is based on several patents owned by Th. Goldschmidt, Essen. The thermit used as anti-piping thermit consists principally of a mixture of metallic aluminum and iron oxide, in equal parts. If this mixture is brought to a temperature of over 1200 deg. C. (2200 deg. F.) the iron oxide is reduced by the aluminum according to the well-known equation:



During this reaction a large amount of heat is set free, which brings the products of the reaction to about 3000 deg. C. (5400 deg. F.).

The anti-piping thermit is applied in sheet iron cans, as shown in Fig. 1. By means of a slender iron rod—which is inserted in the hole in the can, as shown in Fig. 2, the can is introduced into the liquid metal in the ingot mold.

In the first experiments made with anti-piping thermit the process was tried on silicon-treated material, especially forging steel, and never on material not treated with silicon.

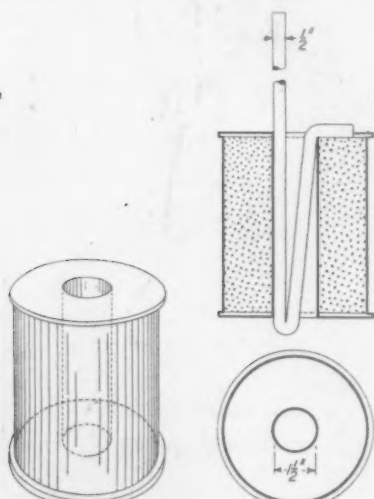


Fig. 1
Method of Handling a Can of Anti-Piping Thermit

The purpose of these experiments was to decrease the piping by introducing the thermit cans into the heads of the ingots directly after pouring, allowing the reaction to take place there, it being thought that, through the absorption of the heat produced during the reaction, the heads of the ingots would be kept hot and the piping reduced.

The improvement

thus caused was found to be slight and not in proportion to the expense involved, as the heat produced by the thermit reaction was altogether too small to increase the temperature of the ingot heads effectively; in fact, extraordinarily large quantities of thermit would be necessary to produce sufficient heat.

The Present Method of Use

The method was therefore changed, and the thermit can was introduced at a fixed time after the ingot had been filled and was pushed down as far as possible in the mold, preferably to the bottom, so that the reaction might take place at the lowest possible point. A strong mechanical effect is thus exercised on the liquid metal in the interior of the ingot. Special additions to the anti-piping thermit are made with the idea of decreasing the melting point of the slag, and thus preventing particles of slag from remaining in the body of the ingot. This improved process was applied only to silicon-treated material, and good results were achieved in several steel works. Encouraged by these results, it was decided to use the anti-piping thermit in steel ingots designed for the manufacture of plates and therefore not treated with silicon.

As the results obtained were favorable from the first, a systematic development of the process was carried out.

On the basis of a great number of experiments made with ingots, weighing from one ton up, the quantity of thermit sufficient for each weight of ingot was accurately determined. It was then found experimentally at what time, after pouring the ingot, the thermit should be introduced, and when more metal should be added in order to obtain the most favorable result.

The manner in which the process is now used is described as follows: The pouring of the ingots is accomplished in the usual way. The filled molds are allowed to remain until the solidification has so far advanced that a crust of considerable thickness is formed on the walls of the mold. The anti-piping thermit can is then pushed to the very bottom of the mold and is held there until the thermit reaction has taken place. The reaction sets up a sudden and strong seething motion in the iron. After the reaction ceases, the surface of the still liquid material sinks, according to its condition, from 3 to 6 in., while the solidified walls remain intact. Then enough hot metal is quickly added, by direct pouring from the ladle, to bring the surface of the still liquid interior of the ingot to the same level as the solidified walls. The molds are then immediately covered and the ingots left to cool.

The Effect of the Thermit

The effect of the anti-piping thermit applied in this manner is as follows: The products of the thermit reaction which are formed in the lower part of the ingot—namely, thermit iron and slag—have a much higher temperature and are considerably lighter than the surrounding steel, therefore they are both thrown with great force toward the top. This accounts for the boiling and seething of the steel in the mold. It is evident that this strong boiling has a favorable effect. It serves to mix thoroughly the entire fluid material, and the iron at the top which has been cooled considerably by radiation is replaced by hot metal from the interior of the ingot. This tends to prevent to a great extent the formation of piping and is made still more effective by the large amount of new metal added. By this operation the reduction of volume caused through shrinkage and the removal of gases is compensated to such a degree that very often the excess material is pressed toward the top with sufficient force to lift the cover. The formation of a pipe is therefore made entirely impossible. Furthermore, a large amount of gas is liberated, as it is not necessary to cover the ingots prematurely, a practice generally followed in ordinary ingot casting. A further removal of the gases is accomplished by the strong boiling of the material caused by the thermit reaction.

Where anti-piping thermit is not used there is a chance that large and small gas bubbles will be caught in the ingot as the metal becomes pasty, thus causing blowholes and porous metal. With the anti-piping thermit reaction, however, all gases are thrown to the top. Furthermore, any segregated and deleterious elements in the steel are likewise thrown to the top, where they can do no harm.

These actions are favored by the fact that the escape of gas is not prematurely interrupted by the covering of the mold, and in consequence of the addition of a quantity of fresh metal the head of the ingot stays hot for a considerable length of time. Therefore, one is able to avoid with certainty the piping and occurrence of large blowholes. A material extremely dense and free from gases is obtained. For these reasons, the thermit-treated ingots yield a very high output in the rolling mill. For example, plates rolled from thermit-treated ingots can be used practically in their entirety, only small parts of the top and bottom of the sheets having to be scrapped.

Practical Results Accomplished

Following is the result of one of the many experiments undertaken to establish the effect of this treatment: From a certain heat of July 12, 1911, two ingots of about 12,800 lb. each were poured. One of the two ingots was treated with thermit in the above manner; the other was left untreated. The ingot treated was rolled to a plate 9 ft. 7 in. wide, 3/4 in. thick and 32 ft. 3 in. long. The output amounted to 75 per cent. The test piece taken from the bottom of the plate gave 50,800 lb. per sq. in. and 31 per cent. elongation; that from the top 53,500 lb. per sq. in. and 29.5 per cent. elongation; the lap

at the top of plate was 10 in. The ingot untreated was rolled to a plate 10 ft. 1 in. wide, 1 5/16 in. thick and 20 ft. 8 in. long. The output was 68 per cent. The tensile test piece from the bottom showed 50,200 lb. per sq. in. and 33 per cent. elongation; while the test from the top of the plate showed 54,900 lb. per sq. in. and 25 per cent. elongation. The lap was 24 in. long.

A great many experiments of this kind were made and always with the same result. In no case was any extensive piping found and the segregation was comparatively small, although the plates were used with the least possible amount of cropping. From July 12 to October 31, 1911, 4409 ingots, weighing from one to eight tons each, were treated with anti-piping thermit. The cost of this treatment amounted to 35 cents per ton of ingots. All ingots thus treated were rolled. These ingots were in all cases 3 to 5 per cent. lighter than those ordinarily used for the same sized plates. Of the 4409 ingots rolled to plates only 16 showed any defects which could be traced to the quality of the material. The total weight of the ingots from which these 16 defective plates were made amounted to 22 1/2 tons, while the total weight of the 4409 ingots was 7628 tons. The loss was thus less than three-tenths of 1 per cent., which is extremely low. The total increase of output was more than 5 per cent. of the quantity charged.

The anti-piping thermit process has shown itself as an extraordinarily simple and effective help in improving the quality of ingots untreated with silicon. Whether it can also be used for silicon-treated ingots and just

Francisco, Cal., will handle steam shovels, wrecking cranes, pile drivers and ballast plows in California, and the same products, with the addition of drag line excavators, in Nevada, Utah and Arizona. The Stuart & Taylor Company has the agency for all of the Bucyrus Company products, with the exception of dredges, in Washington, Oregon and Idaho.

Arrangements have been made with the Yuba Construction Company for the handling of dredges on the Pacific coast, Alaska and the Yukon. All inquiries will be referred to that company at 311 California street, San Francisco. H. N. Steinbarger continues to represent the company at Denver, Col., with offices in the Sugar Building. Mexico will be covered by Smith & Wiggin, Mexico City.

George B. Massey, for a number of years in charge of the New York office of the company, is now located at the general offices in South Milwaukee, preparing for an extensive trip abroad in the interest of its foreign business.

A Handy Utility Tool

Recently B. Morgan, Tew's Court, Newport, R. I., has brought out a utility tool which lends itself readily to a large number of practical purposes. Three views of the tool are given in the accompanying engraving, the tool out of use, in use as a drill jig and also as a spring stretcher being shown in Figs. 1, 2 and 3, respectively.

The contrivance consists of two jaws, one of which is

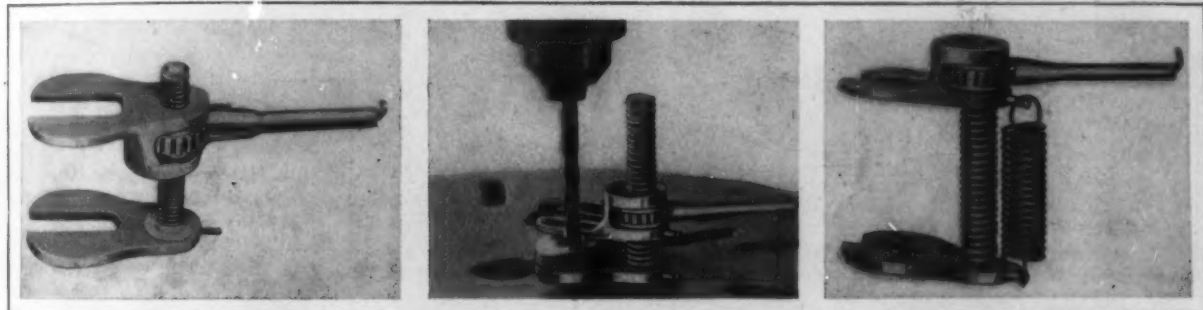


Fig. 1—Not In Use

Fig. 2—A Drill Jig

Fig. 3—Spring Stretcher

Three Views of a New Handy Utility Tool Made by B. Morgan, Newport, R. I.

how it is to be applied in such material, experiments which are now being conducted will show. For the introduction of this process no investment in apparatus is necessary. Its application is very simple and its effect certain. The cost of the anti-piping thermit is low and the benefit of its use can easily be figured in dollars and cents.

The Goldschmidt Thermit Company, 90 West street, New York, controls the process in this country.

The Bucyrus Company's Sales Force

The Bucyrus Company, manufacturer of steam shovels and other contractors' machinery, South Milwaukee, Wis., in connection with its recent reorganization, has made several radical changes in its sales force. Beginning with January 1, Carl Horix, formerly general manager of the Vulcan Steam Shovel Company, took charge of the Chicago office of the Bucyrus Company as central sales manager. With him are E. L. Byron, formerly Eastern sales manager of the Vulcan Steam Shovel Company, and W. S. Russell and B. F. Johnston, both formerly connected with the Vulcan Company. The offices are at 622 McCormick Building. Carl S. Reed, formerly Western sales manager of the American Locomotive Company, is now Eastern sales manager of the Bucyrus Company, with offices at 50 Church street, New York City. With him are J. N. Gawthrop, for several years with the Bucyrus Company, and Edward G. Lewis, formerly connected with the Good Roads Machinery Company.

A Duluth office has been established, with E. C. Hingston in charge. Mussens, Ltd., Montreal, Canada, with offices at Quebec, Toronto, Winnipeg, Vancouver, Cobalt and Calgary, retains the agency in Canada which it has had for several years. Norman B. Livermore & Co., San

fixed on the screw, while the other is moved toward or away from it by a ratchet. Among the uses to which the tool may be put are a hand brace, a drill jig as illustrated in Fig. 2, a valve lifter, a clamp for an electric vulcanizer, a spring stretcher or compressor, as shown in Fig. 3, and for many other kindred uses.

The Pacific Hardware & Steel Company's Enterprise

The ship Edward Sewall, under charter to the Pacific Hardware & Steel Company, San Francisco, Cal., arrived at that port March 10 after a passage of but 126 days around Cape Horn from New York. The ship sailed November 4 and a week afterward encountered such a severe storm that the officers and crew were alarmed. The arrival of a large sailing vessel does not, as a general rule, excite any particular interest in San Francisco, but in this case the event was there regarded as a notable one, for the reason that the entire cargo, consisting of 5500 tons of finished steel, was for one concern.

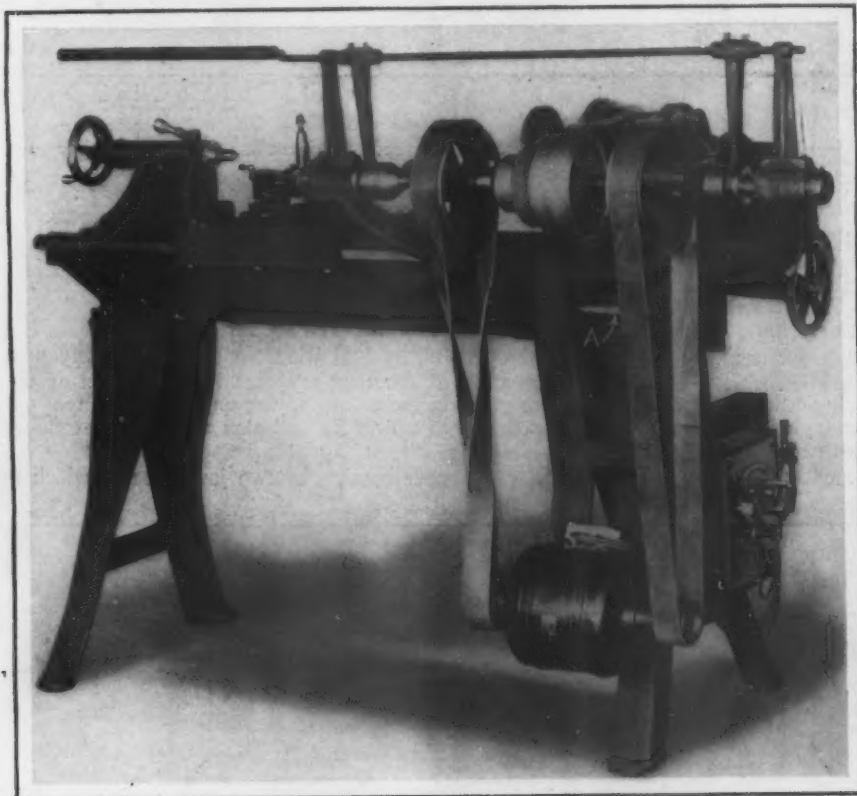
This is the first instance in the history of San Francisco of a mercantile establishment having the courage to attempt an undertaking of such magnitude. The cargo consisted of 275 carloads of 20 tons each, or 9 solid trains of 30 cars each, which, if placed end to end, would reach 2 1/2 miles. This represents the combined daily Eastern freight capacity of all the railroads running into San Francisco.

The Pacific Hardware & Steel Company has also chartered the steamship Cardova to sail from Philadelphia. As in the case of the Edward Sewall the entire cargo, consisting of approximately 2500 tons, will be consigned to the company's San Francisco store.

New Electric Lathe Drive

A new double belt reversible electric drive has been developed by the South Bend Machine Tool Company, South Bend, Ind. This drive, which is called the O'Brien after its designer, is being applied to all the company's motor-driven tools.

The countershaft and the motor are supported on a cast-iron bracket which is pivoted to a casting attached to



A Lathe Equipped with a New Type of Motor Drive Developed by the South Bend Machine Tool Company, South Bend, Ind.

the lathe bed at the point A. If desired this bracket by reason of its adjustment can be employed as a belt tightener between the countershaft and the spindle cone pulleys. A screw in the front of the lathe within easy reach of the operator controls this adjustment which is made so easily that the belt can be tightened while the lathe is in use. A simple adjustment on the base of the motor provides a means for tightening the belt from the motor to the countershaft. Since the complete countershaft is in front of the bracket the starting, stopping and reversing of the lathe and the variation in speed is obtained in practically the same way as if the countershaft were attached to the ceiling. This is made possible by the crossed belt on the motor which gives the double drive and does away with reduction gears and reversing or adjustable speed motors, since any regular motor can be used which has a driving pulley on each end of the armature.

With this drive the operator has complete control of the lathe through the horizontal shipper bar. If desired the crossed belt can be removed from the pulley when work is being done where it is not necessary to reverse the spindle. The knife switch and the starting box can be located in any convenient position on the lathe as shown and if desired can be inclosed in a sheet metal box. No starting box is required, as the knife switch starts the countershaft friction pulleys only which run loose on the shaft. The motor can be of any type, either direct or alternating current, the speeds recommended being 900, 1200 or 1800 r.p.m. The length of belt required for running from the motor armature to the spindle cone pulleys is 48 in.

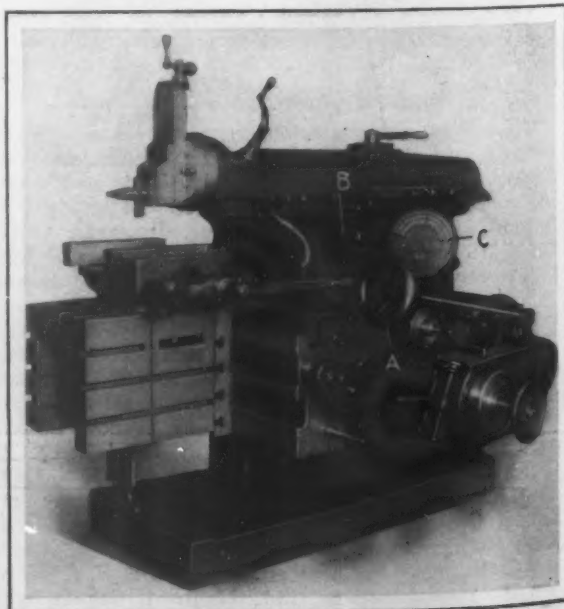
Arrangements have been made by the Ideal Electric & Mfg. Company, Mansfield, Ohio, with the Price Electric Company, 413 Sibley street, St. Paul, Minn., to represent the former company in St. Paul territory and carry a large stock of Ideal motors, generators, etc.

Shaper Starting Control

A new and interesting application of automatic starting control to a motor-driven crank shaper has recently been made by the Reliance Electric & Engineering Company, Cleveland, Ohio. An important feature of this control is a dynamic brake which is used on the shaper in place of a clutch. The machine to which this control has been applied is a 24-in. Gould & Eberhardt crank shaper driven by a 5-hp. Reliance adjustable-speed motor, having a speed range of 300 to 1500 r.p.m. In addition to being equipped with automatic starting control the machine is also furnished with a Reliance speed dial which was illustrated in *The Iron Age*, March 7, 1912.

The speed adjustments with the motor employed are obtained by the mechanical shifting of the motor armature which is controlled by the hand wheel A. By turning this hand wheel quick but smooth changes in the cutting speed are secured and when once the armature has been set to give the correct speed for a given operation the motor can be stopped and started as often as desired without further attention to the speed adjustment. With the armature shifting type of speed variation, the starting and the stopping of the motor are entirely separate from the speed control. When a motor having a speed range equal to the ratio of the back gear is used, a continuous range of cutting strokes is secured from $4\frac{1}{2}$ to 115 per minute. It is emphasized that this practically unlimited number of cutting strokes combined with ample power at all speeds insures the maximum output from any size of cut and any kind of material.

The stopping and starting of the motor are controlled by an automatic starter through the drum switch B, which has three points: start, off, and brake. In starting the motor it is simply necessary for the operator to throw the switch to the starting position. When the switch is thrown to the off position, the power is shut off and the time required by the machine to stop will depend upon the interval required for friction to overcome the momen-



A Shaper Equipped with a New Automatic Starting Control Developed by the Reliance Electric & Engineering Company, Cleveland, Ohio

tum of the moving parts. To bring the motor to a stop at once automatically the switch is thrown to the brake position, an arrangement which eliminates the necessity of employing a clutch. It will be noticed in the accompanying engraving that no clutch is shown and with this arrangement the motor is never running idly and consuming power unnecessarily. The starter, which is of the series control type, automatically takes care of all starting conditions and at the same time it is pointed out removes the possibility of abuse to the motor or starting equipment. As installed the starter is mounted on a near-by post and wires are carried in conduit which is tapped directly into the drum switch, eliminating exposed wiring.

The Reliance speed dial C which was illustrated in *The Iron Age*, March 7, 1912, is a device that is designed for use with an adjustable-speed motor to enable the motor speed to be set instantly to give the desired cutting speed. This appliance is somewhat like a circular slide rule and in the case of the shaper takes into account all the variable factors such as the ratio of the drive, the length of stroke and the cutting speed desired. It

not only serves as a guide in setting the speed accurately, but, as it is always in plain sight, it indicates definitely to the foreman the speed being used by the operator. The way in which the dial is used is very simple. If, for example, it is desired to take a cut at the rate of 40 ft. per minute with a 20-in. stroke the small knurl on the front of the dial is turned until the indicator swinging over the top scale which indicates the cutting speed in feet per minute is opposite 40. By turning the hand wheel A the armature of the motor is shifted until the lower pointer is opposite 20, which is the stroke to be used. No other operation is necessary, and it is thus possible to secure the desired result without any guesswork on the part of the operator.

The Otis Elevator Company's Year

The Otis Elevator Company has issued its report for the year ended December 31, 1911. The income account compares as follows:

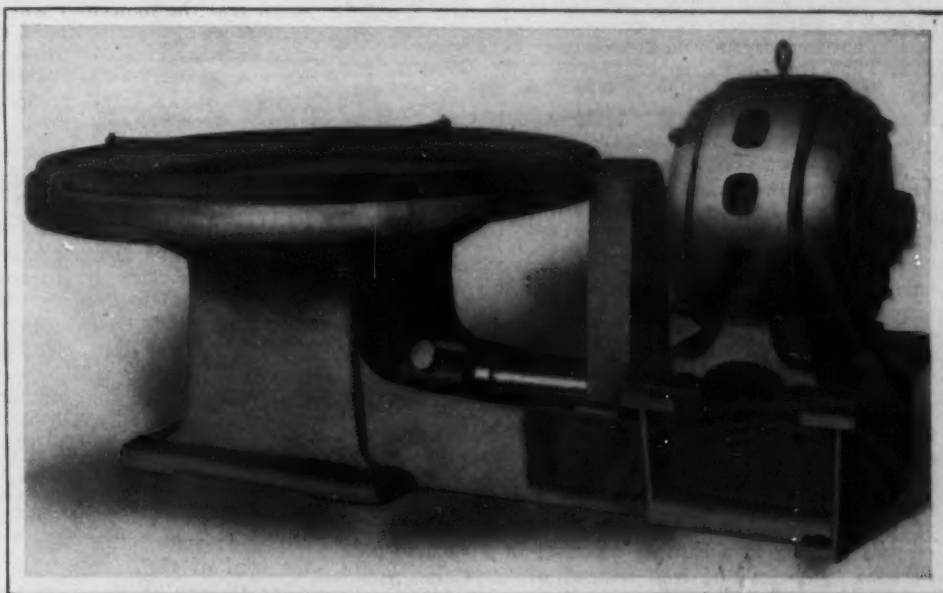
	1911	1910
*Net earnings	\$1,082,116	\$1,157,371
Preferred dividends.....	385,975	381,109
Balance	696,141	776,262
Common dividend	255,012	255,012
Balance	441,129	521,250
Depreciation	331,019	391,124
Surplus	110,110	130,125
*After deducting all charges for interest and patent expenses and for renewals and repairs for maintenance of plant.		

The general balance sheet as of December 31, 1911, shows a surplus of \$2,240,645.

The number of idle cars continues to diminish. The report of the American Railway Association, giving the situation March 13, shows a net surplus on that date of only 3043. The gross surplus of idle cars was 46,028 but shortages totaling 42,985 made the net surplus the smallest in years. This condition is doubtless partly due to the greater severity of the weather this year, but may also be explained by the prospective suspension of coal mining which has caused consumers and shippers to use every effort to add to their reserves and thus brought heavy demands upon the railroads for cars.

A Motor-Driven Vertical Disk Grinder

In addition to the belt-driven No. 24 vertical-spindle disk grinder which was illustrated in *The Iron Age*, February 22, 1912, in connection with the finishing of a number of crank cases by the grinding process, the Gardner Machine Company, Beloit, Wis., also builds this machine with motor drive. This grinder is intended to be used for handling large and heavy work and the motor drive en-



The New No. 24 Motor-Driven Vertical-Spindle Disk Grinder Built by the Gardner Machine Company, Beloit, Wis.

ables it to be placed under a hoist or crane which is a very convenient arrangement.

The grinder is equipped with a 53-in. disk wheel, and a 15-hp. motor mounted on the pedestal at the right drives the main shaft of the machine through a silent chain. From this shaft the power is transmitted to the disk wheel spindle through bevel gears which are fully inclosed and run in an oil bath. The motor pedestal is made in a number of sizes to accommodate the different makes of motors which can be supplied. The starting box is attached to the rear of the machine base and is not shown in the accompanying engraving. The chain and the bevel gears are protected by a guard. The speed of the disk wheel is 500 r. p. m. and the weight of the complete machine is 4500 lb.

When these machines are installed in plants where there is no dust exhaust system the builder will supply an exhaust blower if so desired. The pulley for this blower is attached to the driving shaft midway between the shaft collar and the silent chain.

An Important Sales Manager's Views

The general manager of sales of a large steel concern in the Central West, who has recently returned from an extended business trip, gives his observations on present conditions and the outlook as follows: "I have just returned from a trip through the oil fields of Oklahoma, Louisiana, Texas and California. Operations are increasing at a great rate in the mid-continent fields, and some large line pipe projects are under way. The situation in California is not so favorable, in that the price of oil is exceedingly low, but production is decreasing rapidly now, and it is generally believed that the surplus will be reduced and that operations will become much more active later in the year. I find that jobbers' and retailers' stocks throughout the country are the lowest ever known, in my experience, at least, and out of all proportion to the actual business that is being done. There has been a very large demand for all our products. This has been supplied almost directly from the mill to the consumer (through the jobber), but without going into the jobbers' stocks, and it does not seem possible that that way of doing business can continue very long."

Correspondence

The Corrosion Question

To the Editor:—In his article on "Wrought Iron, Steel and Corrosion," in *The Iron Age* of March 14, William R. Fleming criticises the arguments used in our pamphlet on "Wrought Iron Pipe vs. Steel Pipe" on the following grounds:

1. That iron crystals do not elongate in rolling.
2. That iron may appear fibrous after fracture, yet there is no such a thing as an iron fiber, and that, therefore, it is absurd to say that there are any cinder-coated iron fibers.
3. That the greater resistance against corrosion of wrought iron over steel is due entirely to the extreme purity of the iron crystals between the streaks, lakes, spots and puddles of cinder.

In reply, I wish to state that our argument was not intended for an academic discussion of this question; it was made with a view of putting our opinion of the reason for the greater resistance of wrought iron against ordinary corrosion in such language as could easily be understood by practical men.

In explaining the forming of the iron sponge in the puddling furnace, the word "crystals" was not used in the same sense as used by the ultra-scientific micro-metallgraphist, but was intended as a name for the small particles of pure iron that float around in a bath of puddle cinder in the puddling furnace, like sugar crystals floating in a bath of molasses in a vacuum pan. Perhaps "globules" of iron instead of "crystals" would have been a more scientifically correct designation, and was so used by the writer in his paper on "Iron and Steel," published in the *Pilot* of April, 1906. Anybody who has had an opportunity to watch the crystallization of sugar in a vacuum pan and also the coming to nature of iron in the puddling furnace will admit that from a practical standpoint this comparison is a fair analogy.

The So-Called Fibers in Iron

In order to make the formation of the so-called fibers clear to the practical mind, let us make another analogy by comparing these cinder-coated iron globules to a quantity of lead shot, each ball of which has been dipped in oil, and further assuming these oil-coated shots to be put into a box made of sheet lead and at the same time more oil being poured in with the shots, so as to fill up the cavities between them, and then the box and its contents to be rolled out into a long, narrow strip, say, in the shape of hoop iron, would not each individual shot become elongated? While some of the oil filling the cavities (the surplus cinder) would no doubt be squeezed out in the operation of rolling, is it incompatible with science to assume that a number of thin films of an oily nature have remained in the mass, and that these films have become elongated with the shots?

Let us assume the lead box to be 10 in. square and that each shot is 1/10 in. in diameter. This will give us 100 shots per sq. in. of area, or 10,000 shots for the sectional area (not contents) of the box. Assuming the size of the finished strip to be 1 in. wide and 1/10 in. thick (equal to 1/10 sq. in.), this would mean that this 1/10 of a sq. in. of area would still contain 10,000 shots, or, in other words, each shot has been reduced in area to 1/1000 of its original size and at the same time stretched in the same proportion, and the oil films between the shots, which were probably much less than 1/1000 in. thick when the rolling operation started, would now be reduced to less than 1/100,000 in. in thickness, which would scarcely be noticeable under a microscope of, say, 100 diameters. These elongated shots have now formed a structure containing 10,000 strings of lead in cross section, interlaid with very thin films of oils, or, in other words, this structure would be called fibrous by practical men. In actual practice, in the manufacture of wrought iron, the reduction in the cross section and consequent elongation of each individual globule of iron, from the original puddle sponge to the finished product, are often greater than that in the imaginary lead box mentioned above.

While we believe that the streaks of cinder which are easily discernible by the microscope (surplus cinder) are the main pickets in the fence that retards the wind (corrosion) in blowing through, we wanted to give expression to our opinion that, in addition to these easily discernible streaks of cinder, there are other and finer streaks present in wrought iron, although they may not be perceptible under microscopes of from 20 to 100 diameters, as commonly used. It is probable that some of these very thin streaks of cinder have become stretched so much that the molecules will not hang together, and thus form more of a gauze than a continuous film; so that there may be many loopholes from one iron fiber to the adjoining one, as more fully explained on page 277, vol. 8, Proceedings of the American Society for Testing Materials.

Practical Versus Laboratory Tests

In his assertion that the greater resistance of wrought iron over steel is due to the greater purity of the iron itself, and not to the presence of cinder, Mr. Fleming is simply repeating the argument put forth by other exponents of the electrolytic theory of corrosion, and so far the only proof to back up this theory is laboratory tests. There are other tests, however, which do not agree with these laboratory tests, i. e., by immersing steel plates in sea water for a year, the acid Bessemer steel of 0.10 per cent. phosphorus and 0.40 per cent. manganese resisted corrosion better than the basic open-hearth steel of 0.006 per cent. phosphorus and 0.017 per cent. manganese. Mr. Chapman of Westinghouse, Church, Kerr & Co., made some tests by exposing some sheets of so-called "improved iron" of high purity (soft open-hearth steel) alongside some other sheets made of common steel on the roof of the Maritime Building, New York City, and after 18 months' exposure the so-called "improved iron" sheets were as much corroded as those of the common steel, although in a sulphuric acid test the former lost only 0.83 per cent. against 6.70 per cent. for the latter. (This is another illustration of the unreliability of accelerated corrosion tests.)

We have been informed by a very prominent water works engineer that a section of a conduit made of common tank iron plates (which are generally very high in cinder) outlasted another section of the same conduit made of imported Swedish plates (which are generally very low in cinder, as well as other impurities). Professor Howe states that in cases in which strength may profitably be sacrificed for incorrodibility, it may perhaps be practicable to increase the mechanical protection against corrosion by increasing the cinder. It is an admitted fact that cast iron, which generally contains about 7 per cent. of impurities, resists corrosion much better than wrought iron or soft steel, which often have less than 0.5 per cent. of impurities. This high resistance of cast iron has been attributed to an outer skin of a silicate of iron formed when cast. Is it, then, such an absurd matter for us to claim that a similar silicate of iron distributed in streaks of cinder throughout the body of wrought iron also increases the resistance of the latter against corrosion?

The Question of Segregation

Mr. Fleming states that the segregation of the impurities in steel (and open-hearth iron) during the process of cooling is beyond the power of man to alter. While his so-called open-hearth iron may have somewhat fewer impurities than the older soft steels, yet there are some impurities left, and the trouble caused by segregation would, therefore, be one of a lesser degree only; it would not be eliminated, as it is still beyond the power of man to alter. It is, therefore, a debatable question, which time alone can answer, as to whether this difference in the degree will make itself felt in prolonging the life of all sheets made of the same "batch of stuff," or whether the segregation of impurities would be just as intense, but in fewer spots, so that some spots in the sheets would become perforated just as fast as in the older steel, only there would not be so many holes; and then, above all, no evidence exists that this so-called purer metal does resist corrosion under average service conditions any better than the older steels.

If the theory that wrought iron is a fibrous structure is fallacious, on what other theory can Mr. Fleming explain the fact that wrought iron staybolts will stand vibrations so

much better than steel staybolts, and that their quality can be improved by judiciously preparing the piles so as to have more fibers and less laminations, or how can he explain the results of the tests made by Henry Souther, as published on page 382, vol. 8, Proceedings of the American Society for Testing Materials, where the wrought iron samples stood about 20 times as many reversals of strains as the steel samples of the same size, although the latter had 6 per cent. higher tensile strength and nearly double the elongation of the wrought iron? The late Dr. Dudley, chief chemist of the Pennsylvania Railroad, stated: "There is a very large amount of accumulated experience which seems to indicate that a metal like iron, which is believed to be a bundle of fibers, each one surrounded by slag, and which has within itself the power of the distribution of the strain, is a more reliable metal when subjected to bending stresses than a perfectly homogeneous metal like steel."

As stated above, the arguments in our pamphlet were intended for practical men, and some of the homely comparisons were made to better illustrate the theory that the greater resistance of wrought iron over steel is due to its fibrous structure with its inclosed cinder, and that these life-preserving cinder fibers can never be imitated in steel or so-called open-hearth iron, which is produced in a fluid state, and I leave it to the fair-minded readers of your journal to judge whether our statements have been only mere sophistries, adroitly put, to preclude argument, as stated by Mr. Fleming, or whether they are the honest expressions of our conviction based on many years' practical experience with both wrought iron and steel.

When the discussion of corrosion became more active about six years ago, the champions of steel based their arguments almost entirely on laboratory tests or extraordinary service which produced unusually rapid corrosion. We questioned the reliability of these tests at the time by calling attention to the fact that the behavior of iron and steel in ordinary service contradicted their laboratory tests. The fallaciousness of these accelerated corrosion tests has since been fully exposed, and even some of its former champions, to their credit be it said, are now admitting that it is not only an unreliable test but an actually misleading one, thus fully vindicating our claims made six years ago, and we hope that the doubting Thomases who dispute the theory of the "cinder-coated iron fibers" in wrought iron will also see the error of their present opinion in due time.

While Mr. Fleming disagrees with us in regard to the explanation of the cause, he appears to agree with us fully as to the fact that wrought iron does resist ordinary corrosion much better than steel, and we are particularly well pleased with his statement: "This truth is demonstrated by an overwhelming mass of practical evidence." Is there any such evidence in existence to prove the alleged longevity of this new dead-soft steel, which has been christened "open-hearth iron"?

GEORGE SCHUHMANN,

General manager Reading Iron Company.

READING, PA., March 22, 1912.

Customs Decisions

Printing and Embossing Presses

The Board of United States General Appraisers has laid down the line of demarcation between printing presses and machines used for embossing. P. H. Petry & Co. appear as the protestants in the test case, but importers and users of presses generally are interested directly. Duty was taken by the customs authorities under the act of 1909 at 45 per cent. under the provision for "manufactures of metal." The importers claimed that the machines in question are in fact "printing presses," and as such entitled to enter at 30 per cent.

The machine alleged to be a printing press within the meaning of the law is specially designed to do the work of embossing and gold inlaid or gold stamping on leather and other materials. The machine is a bench lever embosser and stamper, and is supplied with an upper die plate in which the engraved die or form is placed and heated. The machine can also be used without the heating apparatus, and with type, as an ordinary printing press. Judge Fischer reaches the conclusion that the term "printing

press" as used in the tariff act is not broad enough to include the machines in controversy. He holds that there is a wide distinction between embossing machines and the ordinary printing press. The protest is overruled.

Steel Forgings

The board sustained in part claims filed by Thomas Prosser & Co. regarding the classification of crank shafts, piston rods, connecting rods and cross heads. All of the articles were returned for duty at the rate of 45 per cent. as manufactures of metal. The importers set up the contention that the goods are forgings, and therefore dutiable at 35 per cent. Judge Fischer rules that such of the articles as are not further advanced than close forged remain forgings of steel and are properly dutiable as claimed. The articles fully machined in whole or in part are held to be something more than forgings, and accordingly dutiable as assessed at 45 per cent. ad valorem.

Lace Making Machines

The board has decided a controversy between the Government and G. W. Sheldon & Co. regarding the classification of lace-making machines adversely to the importers. The machines were returned for duty at the rate of 45 per cent. ad valorem under the provision in the tariff act of 1909 for "manufactures of metal." It is alleged by the protestants that the goods should be granted free entry under the paragraph for "embroidery machines." In denying the protest Judge Fischer says that, while the proof shows that the machines produce laces, there is not a scintilla of testimony to show that the machines are of the embroidery kind such as Lever or Gothrough types. As free entry is restricted to machines of the type mentioned, the protest is overruled and the collector affirmed.

Sewing Machine Heads

The board has sustained a claim filed by Alfred H. Post & Co., Inc., regarding the classification of sewing machine heads. The collector exacted duty at 45 per cent. under the metal schedule of the present law. The importers asked that the articles be allowed to enter at 30 per cent. as "sewing machines." This is granted and the collector reversed.

Hunting Knives

In a controversy dealing with the rate of duty to accrue on hunting knives fitted with folding or other than fixed blades, the knives were assessed under the provision in the law for knives having other than fixed blades, and K. A. Vallquist, the importer, claimed a lower rate as "hunting knives." The board holds that the collector made the proper assessment.

Iron Castings

F. B. Vandegrift & Co. were given lower duty on iron castings used as ends of spools in winding material in carpet mills. The collector exacted duty at the rate of 45 per cent. under the metal paragraphs. The importers claimed the classification to be erroneous, asking for duty at 7/10 of 1 per cent. a pound as "castings of malleable iron." The claim is sustained and the collector reversed.

Lacquered Metal Boxes

It was decided by the board that metal lacquered boxes used as containers for paints are not "usual" coverings as that term is used in the act of 1909, which would make them properly dutiable as a part of their contents. The collector assessed duty on the boxes at the rate of 4 cents a pound and 25 per cent. ad valorem under the provision for lacquered metal boxes. The collector's assessment is affirmed. The importers included P. Ilfelder & Co., F. B. Vandegrift & Co., Thomas Meadows & Co., Samstag & Hilder Bros., G. A. & E. Meyer, and the H. B. Claffin Company.

Wire Drawers' Plates

George Nash & Co. and other importers were granted a reduction in the duty assessed on wire drawers' plates and workles. The collector exacted 45 per cent. on the articles under the existing law, whereas the importers claimed a rate of 30 per cent. as steel forgings. The lower duty applies also to importations made by P. A. Tasker and the Newman & Andrew Company.

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Lake Iron Ore Prices for 1912

The first sales of Lake Superior iron ore in any year make more or less commotion in the iron trade. A chief reason is that the prices thus established usually apply to a year's supply of ore and hence become a speculative element in a good many future transactions in pig iron and other products. Naturally, as has been often pointed out, the present regime of iron mine ownership by steel companies has taken away that keen interest in Lake ore prices that used to be seen when they were the basis of value for much of the finished steel product of the country.

The usual amount of fencing occurred in the weeks preceding the news given last week that non-Bessemer ores had sold at 65 cents below the nominal prices of 1911, and Bessemer ores at a greater reduction—in the case of sales by one large Cleveland interest at 75 cents below the prices first named last year. It had even been argued, as the situation was discussed last winter, that the ore prices of 1911 should not be reduced (presumably from the real levels, which were 25 to 40 cents below the nominal ones) in spite of the low points to which pig iron and finished products had sunk. It was urged that if ore were reduced the merchant furnaces would only turn around and give a corresponding reduction to pig iron buyers.

The belief that this was a valid reason for holding up ore prices (assuming what is doubtful—that any power existed that could have held them up) was probably just as sincere as was back of the statement commonly made early in 1910—that pig iron could not decline further because 50 cents more was being paid for a ton of Lake ore in 1910 than in 1909. In both cases the position taken was unsound. A stronger reason for an ore reduction could scarcely exist than a state of the pig iron market that compelled a blast furnace company to surrender any fresh advantage it might get in its cost. Such a condition could only indicate buying power so feeble or overproduction so disastrous that the quickest remedy was a deep cut in prices, to tempt buying by sheer cheapness.

A study of the sequels of other cuts in Lake ore prices may suggest that the sellers who have set the pace for 1912 were not heedless of ultimate profit. The low prices of 1898 and 1899 were followed by advances of from \$2 to \$2.50 in 1900. The reduction in 1901, continued through 1902, was succeeded by a higher price in 1903. In 1904, a year of reaction, came the lowest prices in five years, at \$3.25 for old range Bessemer, followed by the consecutive advances of 1905, 1906 and 1907 to \$5 in the last-named year. The panic led to the 50-cent reduction of 1908, continued in 1909 and followed by a \$5 basis in 1910. A reduction of 50 cents in 1911 and now of 75 cents gives \$3.75 for old range Bessemer and \$3.50 for Mesaba Bessemer, which were precisely the basis of 1905, a year of good business at rising prices. At \$3.05 for old range non-Bessemer and \$2.85 for Mesaba non-Bessemer, the 1912 basis for such ores is 15 cents below that of 1905, but in the case of Mesaba ores the difference is more than made up by a 20-cent reduction in Minnesota rail freights.

What is most significant in the prices made in the recent transactions, covering probably 1,500,000 to 2,000,000 tons of ore, is the disposition of sellers to recognize the fact that the ore trade must keep step with other branches of the industry. Not always has this been the case. The inflation of ore values

due in part to the Hill lease and the spreading of the mistaken notion that Lake Superior iron mining had come permanently to a \$1 basis for ore in the ground, created an unnatural condition, bound to be felt ultimately in restricting our power to compete in the foreign trade. The lowering of rail freights in Minnesota and of dock charges on Lake Erie and the prospect that freights from lower lake ports to the furnaces will come down coincide opportunely with the wise action just taken by prominent sellers of ore. That prices for ore will rise again is probably as certain as that there will be higher levels for finished material; but as in the latter the tendency in ore is toward a lower average than that of the past 10 years. Competitive conditions in steel call for competitive conditions in ore. While it would be rash to prophesy that \$5 for Lake Bessemer ore will not come again, it is within bounds to say that the rarer its coming the better for the whole industry.

The Steel Corporation's Report

A feature of the annual report of the United States Steel Corporation issued last week is the omission of the comprehensive statement as to expenditures at the Gary plant, which appeared on page 12 of the report for 1910. Construction work at Gary on the basis of huge appropriations from surplus has passed into history. The huge appropriations from surplus earnings are recalled: \$10,000,000 in 1905; \$21,500,000 in 1906; \$18,500,000 in 1907; \$5,000,000 in 1909 and \$10,000,000 in 1910, making a total of \$65,000,000. The report for 1910 showed that to the close of that year there had been paid from the fund a total of \$60,203,189, while a trifle less than \$10,000,000 of work had been done at Gary by corporation subsidiaries, the American Sheet & Tin Plate Company, American Bridge Company and Chicago, Lake Shore & Eastern Railway Company, and financed by those companies.

The 1911 report shows that in that year there was spent at Gary the sum of \$7,939,813, but this sum is merely grouped with other expenditures, so that the Gary account has practically disappeared from the public showing. These various capital expenditures are brought into a total, and explanation is made of the sources from which the lump sum was secured. It may therefore be interesting to observe that the total expenditures to December 31, 1910—\$69,978,695—were increased in 1911 by \$7,939,813, making a grand total of expenditures at Gary of \$77,918,508. Against these expenditures there were the special appropriations mentioned above and amounting to \$65,000,000, the balance of the expenditures being taken care of partly by financing of various subsidiary companies and partly by funds drawn from other sources, including the regular depreciation and reserve funds.

The Steel Corporation has reached a point where it has little of strictly new construction in contemplation, and particularly so since the construction of the Duluth plant, not a large one as such plants go, is proceeding rather leisurely. The corporation then needs only to make a moderate income as compared with the past in order to meet expectations. Its working capital is large, and its cash on hand at the close of 1911 was \$43,499,128. This is 65 per cent. of the largest amount of cash that the corporation ever held at the close of a year, and that large amount was at the end of 1906, a year in which it had set aside no less than \$21,-

500,000 for the Gary fund. For the ordinary conduct of its business, of course, the corporation requires no large sum of cash.

The Steel Corporation has made noticeable progress in retiring its bonds, having been in operation for ten years and nine months to the close of 1911. Its first mortgage bonds, which were used to purchase a controlling interest in the Carnegie Steel Company—the amount authorized being \$304,000,000 and the amount issued \$303,450,000—carry an annual sinking fund of \$3,040,000, while the second mortgage bonds, issued to the extent of \$170,000,000 late in 1903 and early in 1904, and to the further extent of \$30,000,000 late in 1907, carrying an annual sinking fund of \$1,010,000. Sinking funds have also been maintained against subsidiary company bonds. By these funds the outstanding capital liabilities have been reduced, while by new issues of various sorts the capital liabilities have been increased. A comparison is made below of the condition at the organization of the corporation and on December 31, 1911. The figures for the earlier date are approximate to an extent, inasmuch as the corporation published no regular balance sheet until December 31, 1902, there having been a condensed balance sheet of November 30, 1901, making part of the preliminary report issued at the close of the year. A portion of the data is drawn from that source.

	April 1, 1901	December 31, 1911
First mortgage bonds.....	\$303,450,000	\$270,277,000
Second mortgage bonds.....		189,346,500
Subsidiary company bonds.....	99,391,683	160,877,877
Preferred stock	510,173,770	360,281,100
Common stock	508,212,544	508,302,500
Total	\$1,381,227,997	\$1,489,084,977
Increase		\$107,856,980

Note should be taken of the fact that the corporation started in business with about \$20,000,000 of mortgages and purchase money obligations, which amount has been reduced to a trifle over \$1,000,000, thus effecting a liquidation of value equal to a similar decrease in capitalization.

The gross increase in capitalization was much greater than the net increase shown above of \$107,856,980. The total issue of second mortgage bonds was \$200,000,000 (about \$11,000,000 now lying in sinking funds), and only \$150,000,000 of preferred stock was retired thereby, there being \$20,000,000 issued partly for cash and partly to cover expenses of effecting the preferred stock and bond conversion of 1903-4, and \$30,000,000 issued in 1907 to cover the Tennessee Company absorption. Thus there was a gross increase, in this respect, of \$50,000,000. To the net increase of \$107,856,980 in subsidiary company bonds, shown above, there should be added \$14,575,000 of subsidiary company bonds lying in sinking funds, making a total gross increase in subsidiary company bonds of \$116,000,000, or a gross increase in capitalization of approximately \$166,000,000.

It is needless to dwell upon the intrinsic value and earning power of the various large and small properties acquired by the corporation by means of the various increases in outstanding bonds, or upon the increases effected in the total value of its properties by various improvements made through the medium of appropriations from earnings and application of reserve and depreciation funds, such observations being unnecessary to the present comparison.

It should be observed that while the outstanding capital obligations have been reduced by the placing of bonds in sinking funds, the interest charges have not thereby been reduced, as the bonds in sinking funds all

bear interest. On December 31, 1911, there were \$58,908,500 of steel corporation and subsidiary company bonds in sinking funds, drawing nearly \$3,000,000 a year interest. The operation of the various sinking funds requires that the bonds draw interest. The second mortgage bonds, for instance, provide for a sinking fund of \$1,010,000 a year, this being computed as sufficient, with the interest accretions, to retire the entire \$250,000,000 originally contemplated in somewhat less than 60 years. Thus the interest charges of the corporation have been increased, approximately, by the gross and not the net increase in the bonded indebtedness, or, broadly speaking, by the interest charge upon \$166,000,000 rather than upon \$108,000,000.

It must be remembered that the basis originally arranged for the contributions to depreciation and exhaustion charges was figured with the idea that adequate provision was aided by the ultimate retirement of the bonds. In a measure, these bonds were issued against mineral properties, and it was not necessary to provide the entire annual exhaustion charge in the form of a separate fund. By about 1960, in other words, the entire first and second mortgage bonds, amounting to over \$500,000,000, will have been retired, and the entire interest and sinking fund charges against them will accordingly disappear.

Unnecessary Burdens of Purchasing Expense

The purchasing agent of a large manufacturing corporation recently referred to a phase of the business situation which has generally escaped attention. This is the heavy burden sustained by the industries of the country in the practice of buying "from hand to mouth" the supplies necessary for their own operations. "We hear," said he, "a great deal, particularly when business is dull, about 'selling expense'; but who ever thinks of purchasing expense? Yet one is just as important as the other."

He proceeded to state how, with the restrictions placed by the management upon the quantity of material needed in the shops, offices or field which he was allowed to buy at one time, the amount of work crowded upon his department had increased until the percentage of cost for each item, including clerical labor, stationery and other office supplies, postage, telegrams, etc., had steadily risen, despite every effort to hold it down. This enlarged burden of expense, however, did not begin or end with his department. All through the works, where supplies were used, the small stocks of material on hand necessitated maintaining a closer check upon all of them so that notification would not fail to be sent to the purchasing agent when they were in danger of running out. This meant taking up a great deal of the time of various individuals which might have been expended more profitably for the concern. It also involved more clerical labor and expense in making out requisitions, created a greater number of details to be looked after by all men in responsible positions who had to approve orders, and robbed the works of just that much energy which should have been given to production problems.

After requisitions had been placed and the supplies bought, delays in the receipt of purchased material were not infrequent; and the policy of waiting "until the last minute" before ordering sometimes resulted in the absolute exhaustion of stocks, rendering it essential to secure emergency deliveries at a premium from some dealer in the immediate vicinity; or, if this could

not be done, to let the work stand until the supplies bought could be brought in. On more than one occasion the company's own deliveries, to which heavy penalties were attached, had been delayed by the failure to secure relatively insignificant parts purchased outside, without which, nevertheless, shipment was useless. In other instances auxiliary apparatus or parts had to be sent on later at part carload rates or by express. One case, specifically recalled, involved machinery shipped to Australia. These failures, of course, caused trouble all along the line.

Provided, however, that the orders, once placed, were promptly filled, the supplies had to be checked as received, note made of any defects or deficiencies to be taken up with the sellers, and the records in the purchasing department completed. Next came the handling of the purchase reports and the bills for the goods in the accounting department, and of discounts, remittances, etc., by the treasurer, involving more expense. Added together, all of the items made a total properly chargeable to purchasing expense which was very considerable. As compared with the cost of doing the same work in previous years, when larger stocks were carried, the expense per item from the multiplication of purchases was a great deal more.

Yet even this difference did not represent the full loss sustained; for the purchasing agent, being restricted to relatively small quantities, was not able to buy as cheaply as in taking large quantities. Formerly, also, he had been able by placing season contracts to save a large amount of money annually on standard supplies and, furthermore, to use these as a leverage in obtaining business in return. Considering, therefore, the aggregate of increased expense actually incurred, the opportunities for economy passed by, the penalties and other losses on delayed shipments, the diversion of productive energy as a result of added routine detail, the lessened hold upon reciprocal business, etc., and the waste directly attributable to the practice of "holding down purchases" was positively disheartening.

As an offset, what had the company gained? In this particular case it was not pressed for money, having a cash surplus which would have enabled it to meet all operating expense without difficulty on the basis of its former policy of contracting for liberal stocks. Use was made of these funds in taking advantage of all discounts offered; but otherwise the money lay idle, drawing a low rate of interest. Applying the same conditions to the country at large, with due allowance for cases where financial stringency has compelled halting purchases, and the lesson is obvious.

Boiler Accidents Due to Overcrowding

Boiler makers, in many parts of the country, find much to complain of in the demand made on their resources for repair work. Strange as it may seem, the demand for boiler equipment from old plants is lighter than it has been for years, and practically the only business booked is for new factories. On the other hand, those concerns making a specialty of repair work have been very busy. This means but one thing. Many manufacturers are economizing on power equipment, and while economy is a good policy it sometimes is a dangerous proposition, and especially so when it means crowding a boiler beyond its capacity. In at least one part of the country accidents have been above the average, and it is quite possible that this is true everywhere.

The public rarely hears of an accident, unless it results in the loss of life.

A boiler manufacturer is frequently called on to make repairs that, in his own judgment, are inadvisable, but should he suggest the installation of new boilers he is almost invariably accused of having an ulterior motive. But the principal trouble is that the average manufacturer increases the capacity of his plant without giving any attention to the extra load on his boilers. A prominent boiler manufacturer in the Central West, and one who has been in the business for years, calls attention to the fact that a boiler needs an occasional rest, even more so than an engine. The failure to provide auxiliary equipment, so that boilers may be cleaned and tested from time to time, has been frequently found to be an expensive economy.

Meeting of Jobbers' Associations

The National Association of Jobbers of Wrought Iron Pipe and Fittings is to hold its annual meeting at Atlantic City, N. J., April 22 and 23. The programme, while not complete, will, it is understood, include discussion on the following subjects: "Organized Effort Among Distributors of Steam Supplies"; "Profit Getting"; "Change in List Prices and What Position Should This Association Take in This Connection?"; "Warehousing and Handling of Pipe, Fittings, Valves and Kindred Goods—Methods to Reduce Cost and Increase Efficiency"; "Business Ethics"; "Advisability of Yearly Contracts With Consumers"; "Radiator Valve Situation"; "Conditions Surrounding Sale of Radiation"; "Compensation of Salesmen"; "Relations Between Jobbers in the Central West"; "Relations Between Jobbers in the South"; "Where Should Selling Prices Be Made—at the Office by the Sales Manager or on the Road by the Salesman?"; "Direct Shipments—Are They Desirable and in the Best Interest of the Jobbers and What Does It Cost to Handle Direct Shipment Business?"; "Are the Operations of Brokers Beneficial or Detrimental to Our Interest as Jobbers?"; "Direct Shipments of Small Lots of Cast and Malleable Fittings"; "Resolutions Adopted by the National Association of Master Steam and Hot-Water Fitters, Asking Jobbers to Refrain from Selling to Builders or Owners of Large Estates and to Replace Defective Goods."

The National Association of Jobbers of Plumbers' Supplies will meet in Atlantic City immediately after the pipe jobbers' meeting, or on April 24 and 25. Thomas A. Fernley, Philadelphia, is secretary of both organizations.

The Continental Supply Company

George E. Day, chairman of the board of the Continental Supply Company, has recently returned from a long Western trip, during which he established headquarters for the company at St. Louis and located pipe yards, stores and warehouses at a number of distributing points in the oil fields. These points included Tulsa, Bartlesville and Ponca City, Okla.; Shreveport, La.; Houston and Wichita Falls, Texas; Lancaster and Marietta, Ohio; Lawrenceville, Ill., and Pittsburgh, Pa. Warehouses and store buildings have already been stocked at Tulsa, Bartlesville, Ponca City and Lancaster, and the company expects to be fully established at all the other points within the next 30 days. The executive offices are located in the Third National Bank Building, St. Louis, which will be the headquarters of all the officers of the company. Mr. Day retains his position as secretary and general sales manager of the Youngstown Sheet & Tube Company, Youngstown, Ohio, and is also connected with the Continental Supply Company in an advisory capacity as chairman of the board.

The Sherman anti-trust act is to be made the subject of important amendments. The Senate Committee on Interstate Commerce proposes to make amendments embodying measures submitted by Senators Williams and Cummins, which are alike in principle. It is stated that the committee has rejected the idea of federal corporation as well as the measure prepared by Chairman E. H. Gary of the United States Steel Corporation providing for Government regulation of prices.

Scotch Iron Makers Combine

After protracted negotiations, the amalgamation of the principal makers in Scotland of finished iron—bars, angles, hoops, skelp, etc.—has been brought to a successful conclusion. A new company is to be formed, named the Scottish Iron & Steel Company, Ltd., with a capital stock of about £1,000,000, divided into preferred and common stock and debentures. The combination will take in 14 companies, operating 15 works, with an aggregate output of 250,000 tons of finished iron annually. Their names are as follows: Archibald Baird & Son, Ltd., Downs & Jardine, Thomas Ellis, Ltd., Clencairn Iron & Steel Company, Ltd., C. F. Maclaren & Co., Hugh Martin & Sons, A. & T. Miller, John Spencer, Ltd., Phoenix & Drumpellier Ironworks, William Tudhope & Son, Ltd., Victoria Iron & Steel Company, Ltd., Waverley Iron & Steel Company, Ltd., Woodside Steel & Iron Company, Ltd., and Wylie & Co. There are seven other companies engaged in the manufacture of these products, but their inclusion in the combination has not been found practicable in view of the fact that they also make other iron and steel products. The statement is made that confidence exists that no price-cutting competition will arise between such works and the new company.

Cincinnati Business Men's Meeting

What will probably be one of the largest gatherings of men interested in the iron and steel industry held in Cincinnati for a number of years is scheduled to take place in the banquet hall of the Cincinnati Business Men's Club on the evening of April 10. The programme was arranged by W. F. Robertson, president W. F. Robertson Iron & Steel Company and of the Manufacturers' Club of Cincinnati. The principal speakers named thus far include Charles M. Schwab, president Bethlehem Steel Company, and D. B. Meacham, member of the firm of Rogers, Brown & Co. The affair will be a joint one with the Business Men's Club, and a large number of guests from outside the city are expected. Arrangements have been made for a fine banquet, and the prominence of the principals and speakers guarantees an attendance of representative men who are intensely interested in the present business situation.

Steel Corporation Sells Bonds for Plant Extensions

To take care of plant extensions, the United States Steel Corporation has made a departure in selling bonds instead of making appropriations out of earnings. It has sold to J. P. Morgan & Co., by unanimous vote of the board of directors, except of members of the Morgan firm, \$30,500,000 of bonds bearing 5.1 per cent. interest. The amount will include \$15,000,000 secured on the plant of the Indiana Steel Company, at Gary, Ind.; \$10,000,000 on the Lorain Steel Company, Lorain, Ohio, and \$5,500,000 debentures of the Illinois Steel Company, being part of an issue heretofore authorized.

The official statement in this regard says: "As there must be expended during the year about \$20,000,000 for extensions of properties generally, heretofore authorized, and as about \$17,000,000 additional working capital is needed in consequence of the increased business of the companies, particularly in the ore department, it has been thought advisable to secure the sum named by the sale of bonds in order to keep the amount of cash in hand up to the sum shown at the beginning of the calendar year. In view of the fact that very large sums have heretofore been appropriated from net earnings for capital expenditures, it has been decided to finance some of the capital expenditures as above stated."

A two-part rail known as the Romapac, and planned particularly for street railroad track, is being put down in Chicago for a length of a few miles. The base is first laid in position and the head, which has two flanges projecting downward from the bottom corners, is firmly pressed against the base by means of a special machine which is also employed for removing the head when worn out. The special value lies in the fact that the head may be replaced without disturbing the rest of the track system.

The Iron and Metal Markets

Wide Open Ore Market

Pig Iron and Steel Firmly Held

Heavy Inquiry for Pig Iron, but Furnacemen Slow to Make Contracts

Whatever may have been the motives or influences which caused the slashing of Lake Superior iron ore prices, the result is wholesome. That the ore market is wide open is demonstrated beyond dispute. Prevailing prices at Lake Erie ports show a reduction on last season's quotations of 75 cents a ton on Bessemer and 65 cents on non-Bessemer ores. This means \$3.50 for Mesaba Bessemer and \$2.85 for Mesaba non-Bessemer, old range ores selling at 20 to 25 cents above these figures. It is understood that on a few sales the cut was still deeper, an apparent effort being made by some interests to make prices so low that competitors would have no disposition to offer further inducements. The quotations above given are so low that shaft mines will hardly be able to come out even, although open pit mines may be able to make a little profit. It is stated that a number of mines will be obliged to close and wait for an improvement in prices.

Some sales of Lake Superior ore have been made to Eastern consumers and other business of this character is expected to follow. Mesaba non-Bessemer ore can be delivered to Eastern furnaces at 8.35 cents per unit. Witherbee, Sherman & Co., miners of Port Henry ore, Lake Champlain, reduced their price some time ago and have their output now quite well sold on the basis of 7.25 to 8 cents per unit for various grades delivered to Lehigh and Schuylkill valley furnaces.

It is not expected that the reduction in ore will have much effect on prices of pig iron or finished iron and steel. Pig iron prices have for some considerable time discounted lower costs of ore, while on the other hand coke is so much dearer as to offset considerably the reduction in ore. When prices were cut on steel products in November and December no attention was then given to the relation between the cost of ore and the selling price of steel products.

Threatened labor troubles cloud the immediate future with some uncertainties. The rejection by 50 Eastern railroad companies of the demand for higher wages by locomotive engineers may possibly bring about a strike if the members of the brotherhood, to whom the question is to be referred, should vote in favor of one. The coal operators and miners have not yet come to an agreement and April 1 is close at hand. Iron and steel manufacturers do not seem to be disturbed over this outlook but take the situation with complacency. They are operating on contracts which bring them so little profit that a curtailment of production by enforced suspension of work is looked upon as likely to bring about a better demand and improved prices after the labor troubles shall have been settled.

Specifications for steel products are showing continued increase, having, no doubt, been stimulated by

the generally higher prices which manufacturers are asking. Another influence operating in this direction is that manufacturers are insisting on contracts terminating on the date of maturity instead of unspecified portions being carried over at old low prices. The rate of operation among Pittsburgh steel mills and other manufacturing plants is steadily becoming higher. The Carnegie Steel Company is now operating 94 per cent. of its blast furnace capacity and practically 100 per cent. of its steel making capacity. The production of all kinds of iron and steel this month will, undoubtedly, break records.

The pig iron situation is dominated to a considerable extent by the prospects of a coal miners' strike. Furnacemen are having a great deal of inquiry, on which they are quoting cautiously, having regard to the possibility of being unable to operate their furnaces. Important merchant furnace interests state that they have not more than a two weeks' supply of fuel in stock notwithstanding their utmost efforts to accumulate a larger quantity so as to anticipate the closing of coal mines. Pig iron prices are firmly held, with a tendency to advance.

Ferromanganese commands a sharp premium on account of the interruption to transatlantic steamship service, consumers having contracts being unable to secure expected deliveries. Small lots have sold within the week up to \$60 per ton, which is a premium of \$19 over the regular price.

Considerable activity prevails in foundry coke in the East; excellent contracts having been closed for deliveries running 12 months beginning July 1.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics.

At date, one week, one month and one year previous.

Pig Iron, Per Gross Ton:	Mar. 27, Mar. 20, Feb. 28, Mar. 29, 1912. 1912. 1912. 1911.			
	1912.	1912.	1912.	1911.
Foundry No. 2 standard, Philadelphia.....	\$15.00	\$15.00	\$14.85	\$15.50
Foundry No. 2, Valley furnace.....	13.25	13.25	13.00	13.75
Foundry No. 2, Southern, Cincinnati.....	13.50	13.50	13.50	14.25
Foundry No. 2, Birmingham, Ala.....	10.25	10.25	10.25	11.00
Foundry No. 2, at furnace, Chicago.....	14.00	14.00	14.00	15.50
Basic, delivered, eastern Pa.....	14.50	14.50	14.25	15.25
Basic, Valley furnace.....	13.00	13.00	12.25	13.75
Bessemer, Pittsburgh.....	15.15	15.15	14.90	15.90
Malleable Bessemer, Chicago.....	14.00	14.00	14.00	15.50
Gray forge, Pittsburgh.....	13.65	13.40	13.40	14.40
Lake Superior charcoal, Chicago.....	15.75	15.75	15.75	17.50
Billets, etc., Per Gross Ton:				
Bessemer billets, Pittsburgh.....	20.00	19.50	20.00	23.00
Open hearth billets, Pittsburgh.....	20.00	19.00	20.00	23.00
Forging billets, Pittsburgh.....	26.50	26.50	26.50	28.00
Open hearth billets, Philadelphia.....	22.40	22.40	22.40	25.40
Wire rods, Pittsburgh.....	25.00	25.00	25.00	29.00
Old Material, Per Gross Ton:				
Iron rails, Chicago.....	15.25	15.00	15.00	14.50
Iron rails, Philadelphia.....	15.50	15.50	15.50	18.50
Car wheels, Chicago.....	13.00	13.00	13.00	13.25
Car wheels, Philadelphia.....	12.50	11.75	12.00	14.00
Heavy steel scrap, Pittsburgh.....	13.00	13.00	12.00	14.00
Heavy steel scrap, Chicago.....	10.75	10.75	10.50	11.50
Heavy steel scrap, Philadelphia.....	12.00	11.75	11.75	13.75

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Finished Iron and Steel,	Mar. 27, Mar. 20, Feb. 28, Mar. 29,			
	1912.	1912.	1912.	1911.
Per Pound to Largest Buyers:	Cents.	Cents.	Cents.	Cents.
Bessemer rails, heavy, at mill...	1.25	1.25	1.25	1.25
Iron bars, Philadelphia.....	1.22½	1.22½	1.25	1.37½
Iron bars, Pittsburgh.....	1.25	1.25	1.25	1.35
Iron bars, Chicago.....	1.15	1.15	1.15	1.27½
Steel bars, Pittsburgh.....	1.10	1.10	1.10	1.40
Steel bars, tidewater, New York	1.26	1.26	1.26	1.56
Tank plates, Pittsburgh.....	1.15	1.15	1.10	1.40
Tank plates, tidewater, New York	1.31	1.26	1.26	1.56
Beams, Pittsburgh.....	1.15	1.15	1.10	1.40
Beams, tidewater, New York...	1.31	1.26	1.26	1.56
Angles, Pittsburgh.....	1.15	1.15	1.10	1.40
Angles, tidewater, New York...	1.31	1.26	1.26	1.56
Skelp, grooved steel, Pittsburgh	1.10	1.10	1.10	1.30
Skelp, sheared steel, Pittsburgh	1.15	1.15	1.15	1.35

Sheets, Nails and Wire,

Per Pound to Largest Buyers:	Cents.			
	1912.	1912.	1912.	1911.
Sheets, black, No. 28, Pittsburgh	1.80	1.80	1.85	2.20
Wire nails, Pittsburgh.....	1.60	1.60	1.60	1.80
Cut nails, Pittsburgh.....	1.55	1.55	1.55	1.70
Fence wire, ann'led, 0 to 9, P'gh.	1.40	1.40	1.40	1.60
Barb wire, galv., Pittsburgh....	1.90	1.90	1.90	2.10

Coke, Connellsville,

Per Net Ton, at Oven:	Cents.			
	1912.	1912.	1912.	1911.
Furnace coke, prompt shipment	\$2.25	\$2.25	\$1.80	\$1.60
Furnace coke, future delivery...	2.25	2.25	1.80	1.75
Foundry coke, prompt shipment	2.75	2.75	2.25	2.00
Foundry coke, future delivery...	2.50	2.50	2.25	2.25

Metals, Per Pound:

	Cents.			
	1912.	1912.	1912.	1911.
Lake copper, New York.....	15.50	14.75	14.50	12.50
Electrolytic copper, New York...	15.37½	14.62½	14.37½	12.25
Spelter, St. Louis.....	6.60	6.90	6.75	5.45
Spelter, New York.....	6.75	7.05	6.90	5.60
Lead, St. Louis.....	4.12½	4.05	3.92½	4.30
Lead, New York.....	4.20	4.10	4.00	4.45
Tin, New York.....	43.37½	42.15	43.37½	41.25
Antimony, Hallett, New York...	7.75	7.37½	7.37½	9.12½
Tin plate, 100-lb. box, New York	\$3.54	\$3.54	\$3.54	\$3.94

Prices of Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb., New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Paul, 32c.; St. Louis, 22½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific Coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter, 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.15c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ½ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per square foot, are considered ¾-in. plates. Plates over 72 in. wide must be ordered ¾ in. thick on edge, or not less than 11 lb. per square foot take base price. Plates over 72 in. wide ordered less than 11 lb. per square foot down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras.	Cents per lb.
Gauges under ¼ in. to and including 3-16 in. on thinnest edge	.10
Gauges under 3-16 in. to and including No. 8	.15
Gauges under No. 8 to and including No. 9	.25
Gauges under No. 9 to and including No. 10	.30
Gauges under No. 10 to and including No. 12	.40
Sketches (including all straight taper plates) 3 ft. and over in length	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths or diameters under 3 ft. to 2 ft., inclusive	.25
Cutting to lengths or diameters under 2 ft. to 1 ft., inclusive	.50
Cutting to lengths or diameters under 1 ft.	1.55
No charge for cutting rectangular plates to lengths 3 ft. and over.	

Wire Rods and Wire.—Bessemer, open hearth and chain rods, \$25. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days, or 2 per cent. discount in 10 days, carload lots, to jobbers, annealed, \$1.40; galvanized, \$1.70. Carload lots to retailers, annealed, \$1.50; galvanized, \$1.80. Galvanized barb wire, to jobbers, \$1.90; painted, \$1.60. Wire nails, to jobbers, \$1.60.

The following table gives the prices to retail merchants on wire in less than carloads, including the extras on Nos. 10 to 16, which are added to the base price:

Fence Wire, Per 100 Lb.						
Nos.	0 to 9	10	11	12 & 12½	13	14
Annealed	\$1.55	\$1.60	\$1.65	\$1.70	\$1.80	\$1.90
Galvanized	1.85	1.90	1.95	2.00	2.10	2.20

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in., and angles, 3 to 6 in., on one or both legs, ¼ in. and over, 1.15c. Other shapes and sizes are quoted as follows:

	Cents per lb.
I-beams over 15 in.	1.20 to 1.25
H-beams over 18 in.	1.20 to 1.25
Angles over 6 in.	1.20 to 1.25
Angles, 3 in. on one or both legs, less than ¼ in. thick, plus full extras, as per steel bar card Sept. 1, 1909.	1.20 to 1.25
Tees, 3 in. and up.	1.20 to 1.25
Zees, 3 in. and up.	1.15 to 1.20
Angles, channels and tees, under 3 in., plus full extras as per steel bar card Sept. 1, 1909.	1.20 to 1.25
Deck beams and bulb angles.	1.45 to 1.50
Hand rail tees	2.00 to 2.15
Checked and corrugated plates.	2.00 to 2.15

Sheets.—Makers' prices for mill shipments on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advances for small lots from store, are as follows:

Blue Annealed Sheets.		Cents per lb.
Nos. 3 to 8.....		1.20 to 1.25
Nos. 9 and 10.....		1.30 to 1.35
Nos. 11 and 12.....		1.35 to 1.40
Nos. 13 and 14.....		1.40 to 1.45
Nos. 15 and 16.....		1.50 to 1.55

Box Annealed Sheets, Cold Rolled.		One Pass.	Three Pass.
Nos. 10 to 12	1.45 to 1.50		
Nos. 13 and 14	1.50 to 1.55		
Nos. 15 and 16	1.55 to 1.60	1.65 to 1.70	
Nos. 17 to 21	1.60 to 1.65	1.70 to 1.75	
Nos. 22, 23 and 24	1.65 to 1.70	1.75 to 1.80	
Nos. 25 and 26	1.70 to 1.75	1.80 to 1.85	
No. 27	1.75 to 1.80	1.85 to 1.90	
No. 28	1.80 to 1.85	1.90 to 1.95	
No. 29	1.85 to 1.90	1.95 to 2.00	
No. 30	1.95 to 2.00	2.05 to 2.10	

Galvanized Sheets of Black Sheet Gauge.		1.80 to 1.85	1.90 to 1.95	2.05 to 2.10	2.20 to 2.25	2.30 to 2.35	2.50 to 2.55	2.65 to 2.70	2.80 to 2.85	2.90 to 2.95	3.10 to 3.15
Nos. 10 and 11											
Nos. 12, 13 and 14											
Nos. 15, 16 and 17											
Nos. 18 to 22											
Nos. 23 and 24											
Nos. 25 and 26											
No. 27											
No. 28											
No. 29											
No. 30											

All above rates on sheets are f. o. b. Pittsburgh, terms 30 days net, or 2 per cent. cash discount in 10 days from date of invoice, as also are the following base prices per square for painted and galvanized roofing sheets, with 2½-in. corrugations.

Corrugated Roofing Sheets Per Square.					
Gauge.	Painted.	Galvanized.	Gauge.	Painted.	Galvanized.
29.....	\$2.20	2.45	23.....	\$2.25	\$3.35
28.....	\$1.30	2.45	22.....	2.40	3.50
27.....	1.40	2.50	21.....	2.60	3.85
26.....	1.50	2.55	20.....	2.85	4.15
25.....	1.70	2.90	18.....	3.80	5.40
24.....	1.95	3.00	16.....	4.55	6.25

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on wrought pipe, in effect from December 1, 1911; galvanized iron pipe, from March 1, 1912:

	Steel		Iron	
	Black.	Galv.	Black.	Galv.
¾ and ¾ in.	74	54	68	49
¾ in.	75	63	69	53
¾ in.	78	68	72	59
¾ to 1½ in.	81	72	75	64
2 to 3 in.	82	75	76	65
Lap Weld.				
1½ and 1½ in.	79	72	68	61
2 in.	81	74	74	66
2½ to 4 in.	80	72	73	65
4½ to 6 in.	78	68	71	61
7 to 12 in.	55	47		
13 to 15 in.				
Butt Weld, extra strong, plain ends, card weight.				
¾, ¾, ¾ in.	70	60	63	55
¾ in.	75	69	70	63
¾ to 1½ in.	79	73	74	65
2 to 3 in.	80	74	75	66
Lap Weld, extra strong, plain ends, card weight.				
1½ in.	76	70	66	60
2 in.	78	72	71	63
2½ to 4 in.	77	71	72	65
4½ to 6 in.	70	60	65	55
7 to 12 in.	65	55	60	50
Butt Weld, double extra strong, plain ends, card weight.				
¾ in.	65	59	60	52
¾ to 1½ in.	68	62	63	55
2 to 3 in.	70	64	65	57

Lap Weld, double extra strong, plain ends, card weight.

2 in.	66	60	61	52
2½ to 4 in.	68	62	63	57
4½ to 6 in.	67	61	62	56
7 to 8 in.	60	50	55	45

Plugged and Reamed.

1 to 1½, 2 to 3 in. Butt Weld	Will be sold at two (2) points lower basing (higher price) than merchants' or card weight pipe. Butt or lap weld as specified.
2, 2½ to 4 in. Lap Weld	

The above discounts are for "card weight," subject to the usual variation of 5 per cent. Prices for less than carloads are three (3) points lower basing (higher price) than the above discounts.

Boiler Tubes.—Discounts on lap welded steel and standard charcoal iron boiler tubes to jobbers in carloads are as follows:

Steel.	Standard Charcoal Iron.
1½ to 2½ in. 65	1½ in. 48
2½ in. 67½	1½ to 2½ in. 50
2½ to 3½ in. 72½	2½ in. 55
3½ to 4 in. 75	2½ to 5 in. 60
4 to 6 in. 67½	Locomotive and steamship
7 to 13 in. 65	special grades bring higher prices.

2½ in. and smaller, over 18 ft., 10 per cent. net extra.

2½ in. and larger, over 22 ft., 10 per cent. net extra.
Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft. and all shipments going west of the Mississippi River must be sold f. o. b. mill at Pittsburgh basing discount, lowered by two points.

Pittsburgh

PITTSBURGH, PA., March 27, 1912.—(By Telephone.)

Pig Iron.—The market has been quiet in the past week as regards sales as compared with the recent activity, but prices are strong. The Standard Sanitary Mfg. Company has closed for a total of 6500 tons of No. 2 foundry iron for second quarter delivery for its Allegheny and New Brighton, Pa., works on the basis of \$13, Valley furnace. A small part of the iron was high silicon running 2½ to 3 per cent., for which \$13.25 was paid. The Westinghouse Electric & Mfg. Company has closed for 6500 to 7000 tons of foundry iron for its Pittsburgh and Cleveland foundry departments, for last half delivery. A local steel casting company has bought 1100 tons of Bessemer iron for second quarter from a Sharpsville, Pa., furnace interest at \$14.15, Valley furnace. We note a sale of 200 tons of Bessemer iron for April delivery at \$14.25 Valley furnace. The Colonial Steel Company is in the market for about 5000 tons of basic iron for second quarter and a steel company at Canton, Ohio, is inquiring for a round tonnage of basic iron for the last of the year. We quote: Bessemer iron, \$14.25; basic, \$12.85 to \$13; malleable Bessemer, \$13 to \$13.25; gray forge, \$12.65 to \$12.90; No. 2 foundry, \$13.25, all at Valley furnace, the freight rate for delivery in the Pittsburgh district being 90c. a ton.

Steel Billets.—Prices are firm and slightly higher both in the Pittsburgh and Youngstown districts. The output of open-hearth and Bessemer steel at present is heavier than at any time in the past two years, and deliveries are getting extended. The Carnegie Steel Company is absolutely out of the market as a seller of either Bessemer or open-hearth steel for second quarter. Most consumers of billets and sheet bars are covered by contracts against which they are specifying very heavily, and not much steel is being sold in the open market. We quote: F. o. b. Pittsburgh, Bessemer and open-hearth billets, \$20; Bessemer and open-hearth sheet bars, \$21; forging billets, \$28; f. o. b. Youngstown, Bessemer and open-hearth billets, \$19.50 to \$20; Bessemer and open-hearth sheet bars, \$20.50 to \$21.

(By Mail.)

Large steel interests report that specifications in the past week have shown further betterment and have no doubt been stimulated to some extent on bars, steel plates and shapes by the higher prices the mills are quoting. The new prices of 1.15c. on steel bars and 1.20c. on shapes and plates have not been thoroughly tested out yet, as so far little new business has been placed. It is the belief that it would take a very attractive specification on any of these materials to shade these prices. Local conditions are showing improvement and the rate of operation among the steel mills and other manufacturing plants is steadily getting heavier. The Carnegie Steel Company is operating to 94 per cent. of its blast furnace capacity, while its steel making capacity is running practically full. This company started up the Sharon, Pa., skelp mill on Monday which is the last of the idle plants to resume. The Jones & Laughlin Steel Company is operating its Bessemer and open hearth steel works and finishing mills on the South Side practically full, while at Aliquippa, Pa., it is running three out of four Talbot open hearth

furnaces and three of the four blast furnaces. The other Talbot furnace and the idle blast furnace will go on early in April. There is no doubt that a heavy tonnage of finished material has been held back on account of the cold wet weather and now this delayed business is coming out in very good shape. Output of material and shipments this month will be very heavy and will break some long time records. Following the recent activity in buying of pig iron, the market has quieted down somewhat, but prices are strong. The two local makers of Bessemer steel are reported with no steel to spare for prompt delivery and prices are strong. On account of the high prices of spelter, several mills have put their minimum price of galvanized sheets at 2.90c. Prices on all lines of finished products are firm and some of the leading makers claim the market is in good shape for a moderate advance that can be sustained by the expected heavier demand. Several large contracts in coke have been closed in the past week. Buying of scrap is heavy and consumers are finding more trouble to get scrap at to-day's prices than for some time. The whole market looks better.

Ferromanganese.—Delayed shipments have created a famine in the supply of ferromanganese for prompt shipment, and premiums are being placed by consumers to get quick deliveries. Local dealers report a sale of four or five cars for prompt delivery at prices ranging as high as \$46, delivered, Pittsburgh. This situation is only temporary and will be relieved just as soon as several boats with large cargoes have arrived at port. Regular prices on English 80 per cent. remain at \$41, f.o.b. Baltimore, with a freight rate of \$1.95 a ton for delivery in the Pittsburgh district.

Ferrosilicon.—Inquiries are out for 100 to 150 tons of prompt shipment and we are advised of a sale of 50 tons for April and May at \$70, delivered. The high prices ruling on this material for some months are being firmly held. We quote 50 per cent. in lots up to 100 tons at \$70; over 100 tons to 600 tons, \$69, and over 600 tons, \$68, Pittsburgh. The lower grades are ruling at about \$20 for 10 per cent.; \$21 for 11 per cent.; \$22 for 12 per cent., f.o.b. cars at furnace, Ashland, Ky., or Jackson, Ohio.

Wire Rods.—New inquiries for wire rods are confined to small lots for prompt shipment, most consumers being covered by contracts placed some time ago at lower prices than are ruling now, but prices on these contracts are fixed each month. A sale of 200 tons of open hearth wire rods for April delivery is reported at \$25, Pittsburgh. We quote Bessemer, open hearth and chain rods at that price.

Skelp.—The greater activity in the pipe trade is reflected in skelp, new demand being heavier than for some time, and pipe mills which buy in the open market specifying freely against their contracts. A mill in the Mahoning Valley is reported to have made a sale of 2000 tons of grooved steel skelp at 1.10c. at mill. We quote grooved steel skelp at 1.10c. to 1.12½c.; sheared steel skelp, 1.15c. to 1.20c.; grooved iron skelp, 1.40c. to 1.45c., and sheared iron skelp, 1.55c. to 1.60c., all for delivery at buyer's mill in the Pittsburgh district.

Muck Bar.—No recent sales are reported, but in sympathy with other lines of semi-finished products, and also on account of an advance of about 25c. a ton on forge iron, prices are slightly higher. We quote best grades of muck bar made from all pig iron at \$28.50, Pittsburgh.

Steel Rails.—No important contracts have been placed with the local mills in the past week, but the Carnegie Steel Company reports that specifications against contracts are coming in quite freely. The company is booking good orders for standard sections and light rails for export shipment. It reports domestic orders and specifications for light rails in the past week, amounting to about 3000 tons. Prices on light rails have been advanced from \$1 to \$1.50 a ton. We quote splice bars at 1.50c. per lb. and rails as follows: Standard sections, 1.25c. per lb.; 8 and 10-lb. light rails, 1.29½c.; 12 and 14-lb., 1.20c.; 16 and 20-lb., 1.15c.; 25, 30, 35, 40 and 45-lb., 1.10c., in carload lots, f.o.b. Pittsburgh.

Structural Material.—New contracts placed in the past week have been fairly heavy. The Jones & Laughlin Steel Company has taken a contract for 6000 tons of structural steel for new buildings and extensions for the Mineral Point Zinc Company at Depue, Ill. The Cambria Steel Company, Johnstown, Pa., is to supply 3800 tons of reinforcing steel for the Baltimore viaduct. The American Bridge Company has taken 2400 tons of bridge work for a Western railroad and the McClintic-Marshall Construction Company has some 3000 tons additional work for the Panama Canal. The Ritter-Conley Mfg. Company has two or three fair sized jobs and local steel fabricators are better filled up with work at present than for some months. Prices are firm and the Carne-

gie Steel Company and the Jones & Laughlin Steel Company are quoting 1.20c. on shapes, but on very desirable specifications and large tonnage 1.15c. can still be done.

Plates.—Some large car orders have been placed in the past week. The Wabash Railroad has placed 294 50-ton steel hoppers with the Standard Steel Car Company, 1000 stock cars and 700 steel underframe freight cars with the American Car & Foundry Company and 500 steel underframe freight cars with the Haskell & Barker Car Company, Michigan City, Ind. The Atchison, Topeka & Santa Fe is in the market for 3725 freight cars and 60 passenger cars. The Atlantic Coast Line is in the market for 2000 freight cars and inquiries are out from the car companies for prices on the plates and shapes for these cars. The Seaboard Air Line is tentatively in the market for 1500 freight cars. The Texas Oil Company has placed contracts for the building of two oil carrying boats requiring about 3000 tons of plates which will be rolled by the Carnegie Steel Company. The Bethlehem Steel Company has placed a contract with the Western Gas Construction Company, Ft. Wayne, Ind., for a gas tank requiring 1200 tons of plates which have not yet been placed. The Carnegie Steel Company will supply about 3000 tons of plates and shapes for the new lake steamer to be built by the American Shipbuilding Company of Toledo, Ohio. Additional reported inquiries for cars, but which have not been confirmed, include 12,000 of various types for the Baltimore & Ohio, 3,000 furniture cars for the Chicago, Rock Island & Pacific and 1,000 steel ballast cars for the Chicago, Milwaukee & St. Paul. It is also reported that the Western Maryland, which recently bought 2500 cars, may buy 500 more. General demand for plates from boiler shops and other consumers is heavier than for some time, and local plate mills are operating to practically full capacity. Prices are very firm, the absolute minimum of the market on $\frac{1}{4}$ -in. and heavier plates being 1.15c., while the large makers are quoting 1.20c. on the general run of inquiries.

Sheets.—Very encouraging reports are received from the sheet mills, new orders coming in freely, while specifications against contracts continue very heavy. As an indication of the activity in the sheet trade, we note that the American Sheet & Tin Plate Company is operating its hot sheet mills to about 92 per cent. capacity, while some of the leading independent mills are running nearly full and have a large amount of tonnage on their books for second quarter delivery. The Association of American Sheet & Tin Plate Manufacturers, which met in this city last Friday, is preparing a standard form of contract for the sale of sheets which the association will likely adopt at its next meeting to be held in this city about April 10. Owing to high prices of spelter and heavy orders as well, the American Sheet & Tin Plate Company and several other leading mills are now quoting galvanized sheets on the basis of 2.00c. minimum for No. 28 gauge. Black sheets are also firmer, and 1.80c. on No. 28 is absolute minimum with some mills holding at 1.85c. at mill.

Tin Plate.—Leading makers report that specifications against contracts are being received in heavy volume and new demand is also a little better, especially forterne plates. Can makers are specifying heavily against contracts and shipments of tin plate by the mills this month will be heavier than in any one month in a long time. Prices on tin plate in small lots are slightly firmer, mills quoting from \$3.30 to \$3.40 per base box for 14 x 20 coke plates.

Iron and Steel Bars.—We note a heavy increase in new demand for steel bars for re-inforcing purposes, one local mill reporting that it has booked upwards of 10,000 tons in the past week. The Cambria Steel Company is receiving some large orders for steel bars for this purpose and demand promises to be heavier. Ordinary steel bars are also more active. Two of the local makers of steel bars are quoting 1.15c. on new business, but on very desirable specifications 1.10c. can still be done. We quote steel bars at 1.10c. to 1.15c., the lower price being absolutely minimum and common iron bars at 1.25c. makers mill, Pittsburgh.

Hoops and Bands.—New demand is heavier than for some time and specifications are coming in more freely. Prices are firm and we quote steel bands at 1.10c. to 1.15c. extras as per the steel bar card, and hoops at 1.25c. to 1.30c., f.o.b. Pittsburgh.

Rivets.—Specifications against contracts this month are larger than in any previous month in more than a year. Prices are firm and we quote structural rivets at 1.45c. to 1.50c. and boiler rivets at 1.55c. to 1.60c. f.o.b. Pittsburgh.

Shafting.—Specifications against contracts for shaft-

ing from machine screw makers, the automobile builders and the implement makers are coming in freely and the new demand is also reported heavy. Slightly better prices on shafting are looked for in the near future. We quote cold rolled shafting at 67 per cent. off in carload and larger lots and 62 per cent. in less than carloads delivered in base territory.

Merchant Steel.—Two leading makers report that shipment this month will be heavier than in any one month for more than a year. Prices are firm but as yet are not any higher. We quote: Iron finished tire, $1\frac{1}{2}$ x $\frac{3}{4}$ -in. and larger, 1.15c., base; planished tire, $\frac{3}{4}$ -in. and larger, 1.35c.; channel tire, $\frac{3}{4}$, $\frac{7}{8}$ and 1-in., 1.65c.; toe calk, 1.70c., base; flat sleigh shoe, 1.25c.; concave or convex, 1.55c.; cutter shoe tapered or bent, 2.15c.; spring steel, 1.75c.; machinery steel, smooth finish, 1.50c., all f.o.b. at mill.

Railroad Spikes.—The Wabash, the Nickel Plate, the Baltimore & Ohio and several Eastern roads have been specifying freely against contracts and the new demand is also reported better. We quote railroad spikes in base sizes at \$1.35 to \$1.40 per 100 lb. f.o.b. Pittsburgh.

Spelter.—The market has gone off further in the past week on account of the heavy supply and we quote prime grades of Western spelter at 6.62 $\frac{1}{2}$ c. Pittsburgh; on a firm offer this price might be shaded.

Wire Products.—New demand for wire and wire nails has picked up considerably since the mild weather started and specifications against contracts are coming in a little more freely. However, the season is backward and Spring trade in wire and wire nails this year will not be up to expectations. It is stated that regular prices are being better held at present than for some time. We quote wire nails at \$1.60; cut nails, \$1.50; galvanized barb wire, \$1.90; painted, \$1.60; annealed fence wire, \$1.40, and galvanized fence wire, \$1.70, f.o.b. Pittsburgh, usual terms, freight added to point of delivery.

Iron and Steel Scrap.—Consumption of heavy steel scrap and other grades in the Pittsburgh district, also at other important consuming points, such as Sharon, Pa.; Steubenville, Ohio; Youngstown, Ohio, and Monessen, Pa., is heavier now than at any time for several years and promises to increase right along. Consumers of heavy steel scrap are willing to take in scrap on the basis of \$13, delivered, but dealers are not anxious to sell at this price, believing the market will be better later on. The scrap list of the Pennsylvania Railroad Lines East came out on Monday and contains a very heavy tonnage of all kinds of scrap; bids on the list close on April 2. The Carnegie Steel Company has not made any further purchases of steel scrap in this market in the past week, but the Jones & Laughlin Steel Company is taking in odd lots of selected heavy steel scrap at about \$13, delivered at its South Side works. We note sales as follows: 3000 tons of heavy steel scrap at \$13, delivered, Youngstown and Steubenville; 500 tons of bundled sheet scrap at about \$11.50, Pittsburgh; 100 tons of iron rails at \$15; 1000 tons of low phosphorus melting stock at \$15, and 1000 tons at \$15.25, Pittsburgh; 500 tons of No. 1 busheling scrap at \$12.25, Youngstown, and about 500 tons of No. 2 at \$8.25, Youngstown. Dealers are now quoting as follows, per gross ton, f.o.b. Pittsburgh, unless otherwise noted:

Heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen and Pittsburgh delivery	\$13.00
No. 1 foundry cast	\$12.75 to 13.00
No. 2 foundry cast	10.75 to 11.00
Bundled sheet scrap, f.o.b. consumers' mill, Pittsburgh district	11.25 to 11.50
Re-rolling rails, Newark and Cambridge, Ohio, Cumberland, Md. and Franklin, Pa.	13.25 to 13.50
No. 1 railroad malleable stock	11.75 to 12.00
Grate bars	9.50 to 9.75
Low phosphorus melting stock	15.00 to 15.25
Iron car axles	21.00 to 21.50
Steel car axles	15.50 to 15.75
Locomotive axle	22.00 to 22.50
No. 1 busheling scrap	11.50 to 11.75
No. 2 busheling scrap	8.00 to 8.25
Old car wheels	13.00 to 13.25
*Cast iron borings	9.75 to 10.00
*Machine shop turnings	10.00 to 10.25
†Sheet bar crop ends	14.00 to 14.25
Old iron rails	14.50 to 14.75
No. 1 wrought scrap	13.00 to 13.25
Heavy steel axle turnings	10.25 to 10.50
Stove plate	9.50 to 9.75

*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.

†Shipping point.

Merchant Pipe.—The order of the Philadelphia Company of this city for its season's requirements of pipe, referred to last week, has been placed, and was divided as follows: The National Tube Company, 22 miles of

16-in. Matheson joint pipe; Mark Mfg. Company, 16 miles of plain end pipe; La Belle Iron Works, 10 miles of 10-in., and Spang, Chalfant & Co., Inc., 20 miles of 12-in. The latter concern has also taken a contract from another interest for 15 miles of 16-in. pipe. Nothing has been done as yet with the inquiries of the Ohio Fuel Supply Company for about 60 miles of 12-in. pipe and of the city of Huntington, W. Va., for 22 miles of 10-in. pipe. The new demand for merchant pipe continues fairly heavy and leading pipe mills are operating at 85 to 90 per cent. of capacity. Prices on both iron and steel pipe are reported well maintained.

Boiler Tubes.—Specifications are coming in freely from the railroads for locomotive tubes, and several local mills report that their shipments this month of locomotive tubes will be heavier than in any one month for a long time. The new demand for merchant tubes is quiet and only for small lots, while prices continue to be more or less shaded.

Connellsville Coke.—The new demand for furnace and foundry coke for spot shipment has quieted down, but prices continue fairly strong. An eastern steel company has bought from a local coke dealer 30,000 tons of standard grade furnace coke for April, May and June delivery at \$2.05 in net tons at oven. The Cambria Steel Company, Johnstown, Pa., has contracted for a very large tonnage of furnace coke for delivery over the next two years, commencing July 1. Output of coke in the Upper and Lower Connellsville regions last week was 408,237 tons, an increase over the previous week of about 10,000 tons, and the heaviest output in any one week in more than a year. We quote prompt furnace coke at \$2.15 to \$2.25 and prompt foundry coke at \$2.50 to \$2.75 in net tons at oven. On inquiries for furnace coke for last half of the year \$2 per ton has been quoted, but no business has been closed at this price.

Chicago

CHICAGO, ILL., March 26, 1912.

Improvement in almost every department of trade is the generally accepted status of the market. Prices for structural material and plates at Chicago have been advanced to the basis of 1.35c. and 1.45c. and steel bar quotations have been placed before the trade at 1.30c. to 1.40c. A strict adherence to these prices is promised by the interests making them, but it is likewise true that in other directions considerable business can doubtless be placed in the neighborhood of 1.30c. for plates and shapes and 1.28c. for steel bars. Specifications continue very heavy. Inquiries for and sales of pig iron are fairly numerous, although new business in lots exceeding 1000 tons is uncommon. Last half requirements are under consideration and some orders have been placed, the furnaces asking premiums for that delivery. The local market for old material presents a firmer aspect, with a slightly freer movement.

Pig Iron.—Three or four inquiries for lots of 1000 tons and a large number for 500 tons and less are noted. Nearly all of this iron is intended for third quarter or last half delivery. While the furnaces are not seeking this business, a portion is being accepted, particularly for third quarter shipment, for which on Southern iron \$10.75, Birmingham, is being asked. An additional 25c. is added to make the nominal quotation for the last half. Prompt shipment iron from the South is firmly held on the basis of \$10.50, Birmingham. Inquiry for local irons is also active and the volume of sales shows an increase. Attempts are being made to stiffen prices and in some cases \$14.50 at the furnace is being asked. The prevailing quotation continues at \$14. The coke situation is attracting as much or more attention at the present time among the foundries than pig iron. For Connellsville foundry coke \$3 at oven is being asked and shipment within one week is considered as particularly fortunate. We quote for Chicago delivery, except for local irons, which are f.o.b. furnace, the following prices on prompt shipments:

Lake Superior charcoal.....	\$15.75 to \$16.50
Northern coke foundry, No. 1.....	14.50
Northern coke foundry, No. 2.....	14.00
Northern coke foundry, No. 3.....	13.50 to 14.00
Northern Scotch, No. 1.....	16.00
Southern coke, No. 1 foundry and No. 1 soft.....	15.35
Southern coke, No. 2 foundry and No. 2 soft.....	14.85
Southern coke, No. 3.....	14.35
Southern coke, No. 4.....	14.10
Southern gray forge.....	13.85
Southern mottled.....	13.85
Malleable Bessemer.....	14.00
Standard Bessemer.....	16.75
Basic.....	14.75
Jackson County and Kentucky silvery, 6 per cent.....	16.40
Jackson County and Kentucky silvery, 8 per cent.....	17.40
Jackson County and Kentucky silvery, 10 per cent.....	18.40

Rails and Track Supplies.—The principal purchase of rails in the past week is that by the Chicago, Rock Island & Pacific Railroad, although it was disappointing in its tonnage. The original inquiry was for 26,000 tons and the actual allotment totalled about 16,000 tons, of which the Illinois Steel Company will receive 14,000 tons. Railroad specifications for track fastenings continue very heavy. We quote standard railroad spikes at 1.50c., base; track bolts, with square nuts, 1.90c., base, all in carload lots, Chicago; standard section Bessemer rails, 1.28c.; open hearth, 1.34c.; light rails, 40 to 45 lb., 1.16c. to 1.20c.; 30 to 35 lb., 1.19½c. to 1.24c.; 16, 20 and 25 lb., 1.20½c. to 1.25c.; 12 lb., 1.25c. to 1.30½c.; angle bars, 1.50c., Chicago.

Structural Material.—Among the mill orders of the past week specifications for railroad bridge structural shapes and plates to cover the recent contracts placed were noticeable. General specifications also were well maintained. New prices have been announced for Chicago delivery of shapes on the basis of 1.35c. to 1.45c. There is little likelihood that these quotations will not be shaded by some producers, but 1.30c., Chicago, represents the minimum price that may be expected. The only contract of importance for fabricated material was the award to the American Bridge Company of 891 tons for a new Crane Company building at Chicago. The Crown Iron Works, Minneapolis, will furnish 136 tons for a shop building at the University of Minnesota. We quote for Chicago delivery, mill shipment, 1.30c. to 1.45c. and from store, 1.60c.

Plates.—While no new orders for cars in any considerable quantity are noted, specifications were received at local mills covering material for about 7500 cars. The traffic situation has never been so bad in the matter of car shortage and it is confidently expected that car buying is far from completed. In conjunction with the advance in the price of shapes, the trade has also been advised of new prices on plates on the basis of 1.35c. to 1.45c. We quote for Chicago delivery, mill shipment, 1.30c. to 1.45c., and from store, 1.60c.

Sheets.—The volume of sheet business is being maintained to a very satisfactory degree, but shading of prices is prevalent to a degree that makes the ruling quotation more or less nominal. We quote Chicago prices as follows: Carload lots, from mill, No. 28 black sheets, 2.03c. to 2.08c.; No. 28 galvanized, 3.03c. to 3.08c.; No. 10 blue annealed, 1.53c. to 1.58c. Prices from store, Chicago, are: No. 10, 1.90c.; No. 12, 1.95c.; No. 28 black, 2.30c.; No. 28 galvanized, 3.35c.

Bars.—Bar mill orders continue to aggregate increasing totals and local rolling mills are better situated than for a long previous period. There is still some shading of the price of 1.15c. but the market level is on this basis. Hard-steel bar business has been very quiet and one of the leading mills in this territory has been shut down for about two weeks. A resumption is expected at once. Mild steel bars are held with considerable firmness, the minimum quotation being 1.30c., Chicago, while as high as 1.40c. is being asked for less desirable business. We quote as follows, f.o.b. Chicago: Soft steel bars, 1.25c. to 1.33c.; bar iron, 1.15c. to 1.20c.; hard steel bars, rolled from old rails, 1.15c. to 1.20c. From store: Soft steel bars, 1.50c. to 1.55c., Chicago.

Wire Products.—Although a large tonnage of fence wire and fencing was shipped and there was promise of a heavy spring demand, the volume of second orders remains somewhat in doubt owing to the late spring. Barb wire has been similarly affected. The movement of wire nails and plain wire is moderate in volume. The price situation apparently lacks any disturbing features. We continue to quote as follows: Plain wire, No. 9 and coarser, base, \$1.58; wire nails, \$1.78; painted barb wire, \$1.78 to \$1.83; galvanized, \$2.08; polished staples, \$1.83; galvanized, \$2.13, all Chicago.

Cast Iron Pipe.—Pipe buying has been limited to small and scattered orders. The principal tonnage in prospect is that to be bought by St. Louis, the letting of which is expected to take place in April. We quote as follows, per net ton, Chicago: Water pipe, 4-in., \$27; 6 to 12-in., \$25; 16-in. and up, \$24.50, with \$1 extra for gas pipe.

Old Material.—The scrap market shows a tendency toward increasing strength, and quotations are somewhat higher than a week ago. There is a steady demand in this market for shoveling steel, but at the prices offered difficulty is being experienced in obtaining enough to satisfy the apparent requirements. A somewhat freer movement of material seems to be developing but not to a degree sufficient to weaken in any way the market prices. Offerings of railroad scrap aggregate 8500 tons, including 2500 tons by the Chicago, Burlington & Quincy, closing on the 26th; 4000 tons by the Great Northern, closing on the 29th, and 2000

tons by the Rock Island, closing on the 28th. We quote, for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton.	
Old iron rails	\$15.25 to \$15.75
Old steel rails, rerolling	12.50 to 13.00
Old steel rails, less than 3 ft.	11.75 to 12.25
Relaying rails, standard section, subject to inspection	24.00
Old car wheels	13.00 to 13.50
Heavy melting steel scrap	10.75 to 11.25
Frogs, switches and guards, cut apart	11.00 to 11.50
Shoveling steel	10.50 to 11.00
Steel axle turnings	8.75 to 9.25
Per Net Ton.	
Iron angles and splice bars	\$13.00 to \$13.50
Iron arch bars and transoms	14.00 to 14.50
Steel angle bars	10.75 to 11.25
Iron car axles	18.50 to 19.00
Steel car axles	15.75 to 16.25
No. 1 railroad wrought	11.50 to 12.00
No. 2 railroad wrought	10.50 to 11.00
Steel knuckles and couplers	10.50 to 11.00
Steel springs	10.75 to 11.25
Locomotive tires, smooth	12.75 to 13.25
Machine shop turnings	7.00 to 7.50
Cast and mixed borings	6.25 to 6.75
No. 1 bushing	9.50 to 10.00
No. 2 bushing	6.50 to 7.00
No. 1 boilers, cut to sheets and rings	7.25 to 7.75
Boiler punchings	12.75 to 13.25
No. 1 cast scrap	11.25 to 11.75
Stove plate and light cast scrap	9.50 to 10.00
Railroad malleable	10.75 to 11.25
Agricultural malleable	9.75 to 10.25
Pipes and flues	8.50 to 9.00

Philadelphia

PHILADELPHIA, PA., March 26, 1912.

The market has a decidedly firmer tone and prices are stronger, but much depends on the coal strike problem. There seems to be no question that there will be a cessation of mining operations, and if the period of idleness is not prolonged the trade will not be seriously inconvenienced, as supplies of both coal and coke have been pretty generally provided. Larger and more numerous inquiries for pig iron for forward delivery are noted and heavy sales have been made. In finished material heavy plates continue the most active. Plate and steel billet mills show increased productive rates. The old material market is feverish. High prices continue to be named for prompt coke, but the movement has not been so active as it was.

Iron Ore.—The reduction in the price of Lake ores, for which the market appears to be an open one, has resulted in some inquiry from consumers in this district, and negotiations covering a considerable quantity are pending. There has been no movement in foreign ores. Importations during the week include 24,982 tons of Swedish, 10,400 tons of Spanish and 6300 tons of Cuban ore.

Pig Iron.—The most important inquiry has been that of the Pennsylvania Railroad, which is asking for 5100 tons, as follows: From 600 to 1200 tons of Lake Superior charcoal, 600 to 1200 tons of Southern charcoal, 1200 tons of Salisbury charcoal, 500 tons of high silicon and 1000 tons of low silicon, coke foundry iron, for delivery at its Altoona shops, during the second quarter. Other inquiries for the higher grades of foundry iron, in lots of 200 to 1000 tons, are before the trade, but sellers are not disposed to load up on orders for second quarter or more extended delivery, until something more definite is known regarding the coal mining situation. Stocks on eastern furnace banks are steadily decreasing, and producers' prices are firm, the minimum for standard eastern Pennsylvania No. 2 X foundry being \$15, delivered, while \$15.25 is more freely obtained. There has been an active movement in Virginia foundry grades, with the bulk of the business going to one interest. The Pulaski Iron Company has sold over 10,000 tons during the past two weeks, for delivery in this district, New England and the West. Machinery makers and stove and general foundries are among the larger buyers, and sales for second quarter were made at \$12.50, furnace, covering all grades, while where delivery extended into the third quarter, \$12.75, furnace, was obtained. The leading Virginia interest, which recently withdrew from the market, is reported to have made small sales at \$13 and upward. This figure is now named by several other Virginia producers. An inquiry for several thousand tons of low grade iron, from a Virginia pipe maker, is noted. Two Virginia furnaces, Pulaski and Radford, have been blown out for minor repairs to linings. Small sales of Southern No. 2 and No. 3 foundry, at \$10.50 and \$10.00, Birmingham, respectively, have been made to consumers in this district. Cast iron pipe makers in this vicinity are feeling around for low grade iron, but still have

lower ideas of prices than makers are willing to accept. A sale of a round tonnage of rolling mill forge to a consumer in this district is noted, although an inquiry for upward of 1000 tons of this grade, recently before the trade, has been withdrawn. A more active movement in low phosphorus iron, particularly for forward shipment, is noted and sales aggregating 4000 to 5000 tons have been made at prices equal to \$19.25, delivered here. Considerable inquiry for this grade is still before the trade. One inquiry for 1500 tons of basic iron, for Western Maryland delivery, is under negotiation, while consumers in the central part of the state are reported to be feeling the market for moderate lots. Consumption of basic at the eastern mills is better. The following range of prices is named for standard brands, delivered in buyers' yards in this district:

Eastern Pennsylvania No. 2 X foundry	\$15.00 to \$15.25
Eastern Pennsylvania No. 2 plain	14.75 to 15.00
Virginia foundry	15.30 to 15.50
Gray forge	14.25 to 14.50
Basic	14.50
Standard low phosphorus	19.00 to 19.25

Ferroalloys.—Considerable uncertainty still surrounds the ferromanganese situation. Inquiry for both prompt and forward deliveries is noted, and one sale of 500 tons for forward shipment at \$41, Baltimore, is noted. A number of sellers are, however, still out of the market. Sales of small spot lots at varying prices are noted, in one instance a prompt carload going at \$46, Baltimore. There has been practically no fresh demand for ferrosilicon.

Billets.—The leading producer in this district has increased its number of active open-hearth furnaces and is now operating its mill on double turn. Orders for rolling billets are coming out freely, although few large contracts have been placed. There has been an active demand for forging billets, a good share of the buying being in small special lots, for which premiums are obtained. Eastern mills are firmly maintaining prices, \$22.40 to \$23.40 being quoted for basic open hearth rolling billets and \$26.40 to \$28.40 for forging billets, depending on specifications, delivered in this district.

Plates.—Continued efforts have resulted in the acceptance of business for second quarter delivery at 1.32½c. to 1.35c., delivered in this district. More orders are coming to eastern mills and specifications are heavier. The productive rate has, in instances, increased to 85 per cent. Specifications against orders for bridge, locomotive and boat steel continue heavy. Prices are firmer, considerable miscellaneous business being placed at 1.35c., although 1.30c. represents the minimum for the ordinary run of business, delivered in this vicinity.

Structural Material.—There is still an absence of any important new business in this district. The inquiry for 1000 tons of material for the proposed addition to the machine shop of the William Cramp & Sons Ship & Engine Building Company is still held up. Some inquiry for building material in the south is noted, but develops slowly. Moderate bridge inquiries are also noted. Miscellaneous business in plain shapes is fairly active, and on small business 1.35c. is more easily done, but on round lots 1.30c., delivered here, represents the market.

Sheets.—The demand continues active. Orders coming to Eastern mills are usually small and subject to early delivery. The aggregate volume of business is somewhat above ordinary mill capacity and eastern makers find orders accumulating on their books. Western sheets are reported stronger, although 1.95c. to 2c., delivered here, is named for Western No. 28 sheets, while Eastern mills making smooth, loose rolled sheets readily obtain ¾c. to ⅝c. per lb. advance over the outside quotation.

Bars.—Some effort is being made to get prices of iron bars on a higher basis, but they are still available at 1.22½c., delivered here, although makers name, in instances, 1.25c. and 1.27½c. as a minimum. The actual movement in either steel or iron bars is light. Makers of steel bars usually quote 1.35c., delivered, although it is understood that 1.30c. can still be done.

Coke.—The movement has been lighter, due largely to the fact that producers are not anxious to sell heavily for delivery during April, with the uncertain coal mining situation. Numerous small sales of prompt foundry coke are noted at prices ranging from \$2.75 to \$3.15, ovens, and in some cases delivery will not be guaranteed. Furnace coke for prompt shipment is quoted at \$2.10 to \$2.35, ovens, but sales are not heavy. Contract furnace coke is quoted at \$1.90 to \$2, with foundry coke at about \$2.50, ovens. For delivery in this territory the following quotations, per net ton, represent the full range of the market:

Connellsville furnace coke	\$4.15 to \$4.60
Connellsville foundry coke	4.75 to 5.40
Mountain furnace coke	3.80 to 4.20
Mountain foundry coke	4.35 to 5.00

Old Material.—The market is in an uncertain stage. In instances higher prices have been paid for some grades of old material, but the market has not generally responded. The increased activity of the Eastern steel mills has had a stiffening effect on prices of heavy melting scrap, although some makers will not offer better than \$12 to \$12.50, delivered, for No. 1 heavy melting steel scrap, while in several instances reported sales of 1000-ton lots at \$12.50 and \$12.60 are heard. Borings are quoted higher on sales outside the district. A sale of railroad wrought scrap has been made at \$14.75, delivered. Sales aggregating 1000 tons of No. 1 forge fire at \$11 are reported, also 1000 tons of stove plate at \$10, delivered. An inquiry for 1000 tons of low phosphorus scrap is before the trade. Old car wheels have sold at \$12.50, delivered. It would take but little movement to bring about a sharp advance in prices; meantime quotations are, to a certain extent, nominal and subject to quick readjustment. The following range of prices about represents the market for prompt deliveries in buyers' yards, eastern Pennsylvania and nearby points, taking a freight rate from Philadelphia varying from 35c. to \$1.35 per gross ton, for shipment ranging from prompt to the remainder of the year:

No. 1 heavy melting steel scrap and crops	\$12.00 to \$12.75
Old steel rails, rerolling (nominal)	13.75 to 14.00
Low phosphorus heavy melting steel scrap	15.25 to 15.75
Old steel axles	17.00 to 17.50
Old iron axles (nominal)	22.00 to 23.00
Old iron rails (nominal)	15.50 to 16.00
Old car wheels	12.50 to 13.00
No. 1 railroad wrought	14.50 to 15.00
Wrought iron pipe	12.00 to 12.50
No. 1 forge fire	10.75 to 11.25
No. 2 light iron (nominal)	6.75 to 7.25
Wrought turnings	9.00 to 9.50
Cast borings	8.75 to 9.25
Machinery cast	13.25 to 13.75
Railroad malleable (nominal)	11.75 to 12.25
Grate bars, railroad	10.00 to 10.50
Stove plate	10.00 to 10.50

Cincinnati

CINCINNATI, OHIO, March 27, 1912.—(By Telegraph.)

Pig Iron.—The buying movement that originated about ten days ago has been checked, and there are not many sales and fewer inquiries reported. Nearly all consumers have covered for their first half requirements and quite a number were able to contract for third quarter wants. The decrease in activity has not apparently affected the price situation and both Northern and Southern producers appear more determined to adhere to present quotations. Birmingham furnace operators ask \$10.50 at furnace for second quarter shipment, although a number are willing to make contracts extending through the third quarter at this figure, and doubtless these same interests would not turn down an old customer who offered to book for his requirements throughout the entire year. Northern iron is firm at \$13.50, Iron-ton, for either prompt or deferred shipment, and a customer would not have trouble in placing last half orders at the same price. A Western melter bought 1000 tons of malleable at \$13.50, Iron-ton, July-December movement, and about 500 tons of Northern foundry was taken at the same price to be shipped before December 1. For April-September shipment an Illinois concern took 500 tons of Southern No. 2 foundry at \$10.50, Birmingham. Much attention is paid a local inquiry for about 500 tons of Southern foundry iron for last half shipment and the Pennsylvania Railroad is asking for 1200 tons of Southern charcoal for early delivery. It is generally understood that some Southern iron can be bought for prompt around \$10.25 at furnace. Based on freight rates of \$3.25 from Birmingham and \$1.20 from Iron-ton we quote, f.o.b. Cincinnati, as follows, for prompt shipment:

Southern coke, No. 1 foundry and 1 soft	\$14.00 to \$14.50
Southern coke, No. 2 foundry and 2 soft	13.50 to 14.00
Southern coke, No. 3 foundry	13.00 to 13.50
Southern coke, No. 4 foundry	12.75 to 13.25
Southern gray forge	12.75 to 13.25
Ohio silvery, 8 per cent. silicon	16.45 to 16.95
Lake Superior coke, No. 1	14.95 to 15.20
Lake Superior coke, No. 2	14.95 to 15.20
Lake Superior coke, No. 3	14.70 to 14.95
Basic, Northern	14.95 to 15.20
Standard Southern car wheel	25.25 to 25.50
Lake Superior car wheel	19.00

(By Mail.)

Coke.—Spot shipment coke is still hard to obtain. The high price of coal in all districts is a strong temptation to coke producers to sell their coal and only make enough coke to take care of old customers. This action tends to keep prices up to the same level as quoted during the past two weeks. Connellsville furnace grades continue bringing all the way from \$2.15 to \$2.50 per net ton at oven, but if a purchase was made at the

first named figure the seller would undoubtedly ask for at least 30 days in which to make delivery. Foundry grades are unchanged around \$2.75 to \$3. The Wise County and Pocahontas fields now have about the same conditions fronting producers, and the above prices represent what oven operators are asking and obtaining in that territory. The threatened coal strike is indirectly affecting the market, and it is hardly probable that any lower quotations will rule until this question is definitely settled.

Finished Material.—Specifications on old contracts for steel bars are reported to be very satisfactory. New business has not improved, but there is a hand to mouth buying in small lots that helps out the situation. A number of mill agencies report sales of steel bars at 1.15c., Pittsburgh basis; but this figure could be shaded on a desirable tonnage. Structural material is moving slowly, but 1.20c., Pittsburgh, is the regular quotation in this territory and there is no desire evidenced by agents to cut this price, except for a very desirable tonnage. The local warehouse price of steel remains at 1.60c. and on structural material 1.70c.

Old Material.—A number of local scrap merchants, who have been taking the New York stock market as a barometer of general business conditions, believe that the situation is improving. The recent stiffening of pig iron prices has also had a good effect, and it is quite probable that the market will show another slight advance at an early date. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations the selling prices f.o.b. at yards:

Per Gross Ton.

Bundled sheet scrap	\$7.50 to \$8.00
Old iron rails	12.25 to 13.00
Relaying rails, 50 lb. and up	20.00 to 21.00
Rerolling steel rails	11.00 to 11.50
Melting steel rails	9.00 to 9.50
Heavy melting steel scrap	9.25 to 9.75
Old car wheels	11.25 to 11.75

Per Net Ton.

No. 1 railroad wrought	\$9.75 to \$10.25
Cast borings	5.50 to 6.00
Steel turnings	5.75 to 6.25
No. 1 cast scrap	10.00 to 10.50
Burnt scrap	6.50 to 7.00
Old iron axles	15.75 to 16.25
* Locomotive tires (smooth inside)	11.25 to 11.75
Pipes and flues	7.00 to 7.50
Malleable scrap	7.50 to 8.00

Cleveland

CLEVELAND, OHIO, March 26, 1912.

Iron Ore.—The new ore prices, making a reduction of 75c. a ton on Bessemer and 65c. on non-Bessemer ore, at which price considerable tonnage has been sold, are generally accepted as the established prices, and ore firms are making no efforts to get higher prices. Some sellers, however, do not appear to be making the efforts to effect sales that they would if prices were higher, and one or two announce that they will take only a limited tonnage at the ruling rates, believing that better prices will prevail later. They call attention to the fact that several years ago, when similar conditions prevailed, an advance was made in the latter part of the season. From other indications and from the fact that ores are selling at low prices some ore men now predict that the shipments for 1912 will exceed any previous year. Before the price reduction it was predicted that shipments would be 40,000,000 tons. Now the prediction is made that it will be 3,000,000 or 4,000,000 tons over that figure. The big cut in prices came as a surprise to most of the ore men, who did not expect a reduction of over 50c. While there had been some sales during the week the market cannot be said to be active. Furnacemen are not rushing to place contracts, but an increased volume of business is expected in the next two or three weeks. Two round lots of Lake Superior ore have been sold to Eastern consumers and it is expected that present prices will result in the sale of considerable tonnage in the East. Based on an average rail freight rate of \$1.45 from Buffalo Mesaba non-Bessemer can be delivered to Eastern furnaces at 8.35c. per unit and off grade ore can be delivered at about 8c. The situation growing out of the price cutting is proving a perplexing one to many of the ore mining companies. It is announced that it will be impossible to operate some properties in both the Mesaba and old ranges that pay high royalties. Some mines will be operated at a maximum in order to cut down costs, and it will be the policy of other mining companies to mine a minimum output. The Lake rates for ore appear to be still unsettled. While one shipper reported the closing of con-

tracts for carrying 900,000 tons at 40c. a ton, the carrying charges of two other contracts—one for 600,000 and another for 300,000 tons—are reported on the basis of 45c. net to the vessels, or the same as last year. The unloading rate, which will be cut, will be fixed before the opening of the shipping season. The Interstate Commerce Commission and the carriers have been conducting negotiations for some time looking toward a solution of the dock leasing system, and as a result the docks in the future will be operated by the railroads themselves, which may employ agents that are not consumers of ore. We quote prices as follows: Old range Bessemer, \$3.75; Mesaba Bessemer, \$3.50; old range non-Bessemer, \$3.05; Mesaba non-Bessemer, \$2.85.

Pig Iron.—The reduction in ore prices has had no apparent effect on pig iron prices. The fact that ore would be considerably cheaper had been largely discounted by the furnacemen for some time. Furnaces generally, however, will not get the benefit of the reduction in the cost of their output for some time, as it will be late in the season when most of them get their high priced ore used up. Another factor in keeping pig iron firm is the increased cost of coke, which about offsets the reduction in ore. With the ore situation cleared up the foundries are taking an interest in pig iron for the third quarter delivery and are sounding the market with inquiries for third quarter and last half delivery for lots ranging from 500 to 2000 tons. Valley furnaces are quoting No. 2 foundry at \$13.25 for the third quarter, but some are asking an advance of 25c. for the last quarter. One local interest had advanced its price of \$13.50, Cleveland furnace, for the last half for foundry, malleable and basic iron. Another local interest is selling No. 2 foundry at \$12.75 to \$13 for outside shipment and will take on tonnage at those prices for the third quarter. A Cleveland selling agency reports considerable inquiry for foundry, malleable and basic iron in lots up to 5000 tons for third quarter delivery in other territories. The demand for Southern iron is fairly active. A leading pipe interest is again buying and cleaning up stocks in Southern furnace yards. A Cleveland seller reports the sale this month of over 10,000 tons of Southern iron, none of it at less than \$10.50, Birmingham, for No. 2. We quote the following prices for prompt shipment and for the second quarter, delivered Cleveland:

Bessemer	\$14.15
Basic	13.75
Northern foundry No. 2	13.25
Southern foundry No. 2	14.85
Gray forge	12.50
Jackson silvery, 8 per cent. silicon	17.05

Coke.—The Western New York interest which was reported in the market for 15,000 tons of furnace coke for three months is understood to have bought that tonnage. Furnace coke is quoted at \$2.25 per net ton at the oven. Foundry coke is very firm at \$3 a ton and some sales are reported at \$3.15. The only demand is for carload lots.

Old Material.—The market is not active. Some small sales are reported, but transactions are largely between dealers. Local mills refuse to pay over \$11.50 for heavy melting steel. Some sales are reported at that price, but dealers generally are asking \$11.75 to \$12. The quotation on that grade is advanced 25c. a ton. Dealers' prices, f.o.b. Cleveland, are as follows:

Per Gross Ton.	
Old steel rails, rerolling	\$12.25 to \$12.75
Old iron rails	14.00 to 14.50
Steel car axles	17.50 to 18.00
Heavy melting steel	11.50 to 12.00
Old car wheels	12.00 to 12.50
Relaying rails, 50 lb. and over	22.50 to 23.50
Agricultural malleable	10.50 to 11.00
Railroad malleable	11.50 to 12.00
Light bundled sheet scrap	9.50 to 10.00
Per Net Ton.	
Iron car axles	\$18.50 to \$19.00
Cast borings	6.75 to 7.00
Iron and steel turnings and drillings	7.25 to 7.50
Steel axle turnings	7.75 to 8.00
No. 1 busheling	9.50 to 10.00
No. 1 railroad wrought	11.00 to 11.25
No. 1 cast	11.25 to 11.75
Stove plate	9.00 to 9.25
Bundled tin scrap	11.00 to 11.50

Finished Iron and Steel.—Improvement in the demand, both in specification and current orders, continues, and with firm prices the situation is regarded as very satisfactory by sales agents. Some of the independent producers that had not previously made an advance have raised prices on steel bars and 1.15c., Pittsburgh, now appears to be the minimum quotation. Not much new steel bar business is coming out, however, consumers generally are covered through the second quarter at 1.10c. Most mills are refusing to sell finished

lines for delivery beyond July 1. Structural material is firm at 1.20c., Pittsburgh, and some contracts are being placed at that price. Plates are quoted at 1.20c., Pittsburgh, but desirable tonnage can probably still be bought at 1.15c. Black sheets are still quoted at 1.80c., but galvanized sheets are firmer, 2.85c. being the usual quotation. Makers of hard steel bars have advanced their price \$1 a ton to 1.10c. The demand for iron bars is moderate, with prices unchanged at 1.20c., Cleveland.

Birmingham

BIRMINGHAM, ALA., March 25, 1912.

Pig Iron.—Doubtless the feature of greatest interest to the iron trade here was the decision of some interests to take on business running through the remainder of the year and some good sales have been booked for shipment over the last half. This practice as to selling so far ahead has not yet become general, however, and in the meanwhile such iron of the lower grades as is offered for nearby delivery is picked up as rapidly as the offerings are made public. There is no material change here in the situation as to production and shipments, it being generally conceded that shipments are keeping fully up to the make if not slightly reducing the accumulated stocks. The market here is certainly very much firmer than it has been at any time in the past several months and the disposition generally is to take only limited tonnages where sales are made through the remainder of the year. One large interest reports sales for the month as much heavier than the make for the month and that none of these sales was for last half delivery. There is one very large inquiry out now with several inquiries running 1000 to 5000 tons each. It can be said that the market is certainly very firm for any delivery during the remainder of the year on the following schedule per gross ton f. o. b. furnaces Birmingham district:

No. 1 foundry and No. 1 soft	\$11.00
No. 2 foundry and No. 2 soft	10.50
No. 3 foundry	10.00
No. 4 foundry	9.75
Gray forge	9.50
Standard basic	10.50
Off basic	10.00
Charcoal carwheel iron	\$22.00 to 22.50

Cast Iron Pipe.—Makers of water pipe announce that sales for the past week were very good both as to volume and as to prices obtained. Inquiries continue to come in at a goodly rate. The condition of the pipe market is better than it was this time last year. Shipments continue to move at a very satisfactory rate and it develops that there is practically no accumulation of cast iron pipe on any of the yards in Alabama. The outlook for the production of water pipe is certainly full of promise and the year 1912 will doubtless prove a record breaker for Alabama based on present indications. Prices continue at the following schedule per net ton f. o. b. foundry at Birmingham, Bessemer and Anniston: 4 to 6-in., \$23; 8 to 12-in., \$22; over 12-in., average, \$21, with gas pipe taking the usual differential of \$1 per ton more.

Old Material.—The past week has not been a very active one with the scrap iron people. Inquiries seem to have been very quiet and the market appears to have gone a little flat. The strong position of the pig iron market, however, tends to buoy up the scrap market and prices remain firm on the following schedule per gross ton f. o. b. dealers' yards here:

Old iron axles (light)	\$12.50 to \$13.00
Old steel axles (light)	11.50 to 12.00
Old iron rails	11.50 to 12.00
No. 1 railroad wrought	10.50 to 11.00
No. 2 railroad wrought	9.00 to 9.50
No. 1 country wrought	6.00 to 6.50
No. 2 country wrought	5.50 to 6.00
No. 1 machinery	8.50 to 9.00
No. 1 steel	8.00 to 8.50
Tram car wheels	7.50 to 8.00
Standard car wheels	9.50 to 10.00
Light cast and stove plate	6.00 to 6.50

St. Louis

ST. LOUIS, Mo., March 25, 1912.

The rapidly increasing number of inquiries in the local market for material of all classes, though quantities sought are not large, has developed a strong tone as to prices and some advances are noted.

Pig Iron.—Sales made during the week were chiefly in carload lots up to 100, 200 and 300-ton lots, but under such conditions as to indicate very clearly the needs of the melters. Included in the sales of the week were one of 1000 tons of No. 2 Southern; another of the same quantity of Northern for second and third quarter de-

livery and a third of 1000 tons of malleable, though the latter is reported as having gone slightly under the general market quotation. There was also a sale of 1000 tons of No. 3 Southern and in the various grades there are a number of inquiries still unfilled, among them one for 500 tons of No. 4 Southern which is more than is to be found in this territory at the present writing of that grade. Quotations are very strong at \$10.50 for No. 2 Southern, Birmingham basis; \$13.50 for Northern, Iron-ton basis, and \$16 for malleable. No. 4 Southern is quotable at \$9.75, with none to be had, and No. 3 at \$10. Nothing is to be reported in basic at present.

Coke.—Coke put in a lively week and sales were entered here as high as \$3.25 for 72-hr. best selected at the oven, Connellsville or Virginia. The run of business was heavy in the total, though the individual orders were not very large. There was decided stiffening of prices for contracts and the quotation for the moment for delivery July 1, 1912, to July 1, 1913, is \$2.40 to \$2.50 at oven, but in at least one instance the order has gone forth that quotations on that basis now outstanding will be withdrawn on all business not formally closed by Wednesday noon. The car shortage previously reported has been overcome, but the ovens are still unable to ship as heavily as wanted. By-product coke is fully in line with the foundry grades in the present movement of prices here.

Finished Iron and Steel.—The Illinois Traction system is a prospective buyer of rails for extensions and replacement. In light rails there is no business with either lumber or coal lines, but orders have been heavy in track fastenings. Spikes are quotable here at \$1.60 and bolts at \$2.05, St. Louis. In structural work the chief interest has been in the change of sentiment among the fabricators, who are expected to become bidders shortly on considerable quantities of material. The new price of 1.20c., Pittsburgh, is being well maintained on plates and shapes. Orders generally have been good in the aggregate, though there have been no large individual requirements placed. The difficulties in the way of the new Monward building, requiring about 6000 tons, have been cleared away, and as wrecking is announced for May 1 this job will soon be in the market. The Wabash has placed orders in addition to those already given for 1200 steel underframe box cars for June and July delivery and this week will place orders for a large number of automobile cars. The freight car orders were divided between the American Car & Foundry Company and the Haskell & Barker Car Company and another order for 1000 steel underframe stock cars for June delivery was placed with the former company.

Old Material.—The scrap market is holding its prices by grace of the snow which has again delayed the picking up of material for a time. By the time it is off the ground the dealers hope to have the market in control and to be able to prevent any drop with the inrush of spring supplies. No new lists were issued by the railroads during the week. We quote prices, f.o.b. St. Louis, as follows:

Per Gross Ton.	
Old iron rails	\$14.00 to \$14.50
Old steel rails, re-rolling	11.00 to 11.50
Old steel rails, less than 3 ft.	11.25 to 11.75
Relaying rails, standard section, subject to inspection	21.50 to 22.00
Old car wheels	12.50 to 13.00
Heavy melting steel scrap	10.50 to 11.00
Frogs, switches and guards cut apart	10.00 to 10.50

Per Net Ton.	
Iron fish plates	\$12.50 to \$13.00
Iron car axles	17.50 to 18.00
Steel car axles	15.00 to 15.50
No. 1 railroad wrought	11.00 to 11.50
No. 2 railroad wrought	10.00 to 10.50
Railway springs	9.25 to 9.75
Locomotive tires, smooth	11.00 to 11.50
No. 1 dealers' forge	8.00 to 8.50
Mixed borings	6.00 to 6.50
No. 1 busheling	8.50 to 9.00
No. 1 boilers, cut to sheets and rings	7.50 to 8.00
No. 1 cast scrap	10.00 to 10.50
Stove plate and light cast scrap	8.00 to 8.50
Railroad malleable	8.50 to 9.00
Agricultural malleable	7.50 to 8.00
Pipes and flues	7.50 to 8.00
Railroad sheet and tank scrap	7.00 to 7.50
Railroad grate bars	8.00 to 8.50
Machine shop turnings	7.00 to 7.50

M. Cohen, wholesale dealer in scrap iron, metals and rubber, has removed his office to his plant on the northwest corner of Lewis and Biddle streets, St. Louis, Mo. He was formerly interested in the Cohen-Schwartz Rail & Steel Company, severing his connection in January.

The German Iron Market

German Iron Makers Have Good Coal Stocks

BERLIN, March 14, 1912.

The matter of chief interest to the iron trade this week is the great coal strike that broke out on Monday. Up to the present no bad effects have been observed, and it is generally reported from the iron trade that no curtailment in production will probably be necessary for several weeks. The stocks of coal and coke on hand with iron companies and the Coal Syndicate are said to be sufficient to supply the requirements of the iron industry for about six weeks, whereas nobody believes that the coal strike can last so long as that. On the other hand, an unwelcome effect of the strike for such concerns as do not produce their own coal, or have not already provided for their requirements, will be that they will have to pay more for fuel. The Coal Syndicate has begun to sell from its large stocks at an advance of 3 marks a ton. From Belgium it is also reported that coal prices have been marked up.

In the iron trade the upward movement of prices has at length reached an end, just as it did a year ago about this time. Market reports now speak of a quieter tone, and even a certain degree of doubt is mentioned by one, which asserts, for example, that waste and scrap iron have begun to fall. The production of pig iron continues to increase. The average daily production in February was 45,511 tons, as against 44,275 in January. The total February figures, 29 days, were 1,319,827 tons, as compared with 1,372,749 tons in January, 31 days. This month a new record will be established, unless the output be reduced by the coal strike. At the Gelsenkirchen's new Adolf-Emil Hütte at Esch, in Luxemburg, the fourth furnace has just been blown in, and the remaining two will go into operation next month. The entire six furnaces will have a daily capacity of 1500 to 1600 tons. From that region it is reported that pig iron is being called for delivery very urgently. Some of the big mixed works are not able to supply their demands from their own furnaces, and are trying to buy supplementary amounts.

The Steel Syndicate's Operations

The shipments of the Steel Works Union in A products in February were heavy, amounting to 502,272 tons, as against 478,578 tons in January, and 414,445 tons in February, 1911. The following are the figures for the chief classes for the month, as compared with February, 1911:

Exports of—	1912 Tons	1911 Tons
Pig iron	88,023	57,328
Half-rolled steel material	61,215	50,624
Beams	29,172	26,489
Steel rails	51,908	49,195

Although the Union is now so near the end of its existence under the present contract, another attempt will be made at its next meeting to have the allotments in bars and wire rods raised 20 per cent. It is not believed that the promoters of this plan seriously hope to get the increase, but only in this way to force forward the discussion of the renewal of the Union. It cannot be said that the prospects for the renewal have improved. The utmost that is now hoped for is that an agreement can be arranged to make a temporary prolongation for six or even three months, with the hope that terms can in that time be arranged for a longer period.

The Hardware Trade Active

A report on the trade in heavier hardware indicates great activity. The demand for all kinds of goods has undergone a marked increase, especially from the home trade. The export trade is also improving, and better prices are now obtained on foreign orders. Orders on hand run for long periods ahead.

The trade in screws is so heavy that many shops have been compelled to work overtime, and some establishments are enlarging their capacity. The shops complain in many instances that they are unable to obtain the necessary supplies of steel promptly enough to enable them to keep pace with their orders. The association controlling this specialty has opened business for only a part of the June quarter, which is taken to mean that it contemplates a further advance of prices, following upon a recent rise of 3 to 5 per cent. The rivet mills are running at their utmost capacity, without being able to fill all orders promptly; they could sell more than they are turning out. Open-hearth steel rivets for boilers, bridge and ship construction command 225 to 235 marks. Builders' and furniture-makers' hardware for the second quarter has been raised in price 5 to 6 per cent. Manufacturers of tools

have so much work for the home trade that they are neglecting somewhat to push their foreign business; nevertheless, exports are running about 9 per cent. above last year.

Machine Tool Builders Prosperous

The builders of machine tools are enjoying an unusual run of prosperity; their business is better than it has been for some years. Orders in hand are so heavy with some of the shops that they are refusing to take further business for the present, especially for anything like prompt delivery. Prices are firmly held, being now generally higher than a year ago. Stocks of manufacturers and dealers have been considerably reduced within a half year. The export trade is unusually good; exports are running about 7800 tons a month, or 23 per cent. above last year's figures. On the other hand, imports are dropping off and amount now to only about 8 per cent. of exports. Germany's exports go chiefly to Russia, Switzerland, Argentine, Brazil, Holland, Norway and Sweden. A considerable increase in the exports to Belgium, Italy, Austria and France has latterly been registered.

Efforts have recently been made again to organize the wire trade, but without a favorable result, two of the largest establishments having refused to take part.

The Eisen und Stahlwerk Hoesch, of Dortmund, is about to begin the erection of two new blast furnaces. In order to make room for them 300 coke ovens at the Dortmund establishment are to be demolished, new ovens to take their place having already been built at one of its collieries in that district.

Buffalo

BUFFALO, N. Y., March 26, 1912.

Pig Iron.—The market for the week shows increased activity and continued brisk demand, particularly for third quarter delivery. Sales for the week aggregate about 15,000 tons, largely foundry grades; but with some malleable and basic, including one order for 3000 tons foundry grades. The total inquiry was quite large, approximating 35,000 tons foundry grades for second and third quarter delivery; besides some inquiry for malleable and basic. Most furnaces in the Buffalo district are well sold up for their second quarter output and are very firm in their price views, holding at top notch figures for such delivery; but on inquiries for third quarter and last half, on account of not being backed up for that period are willing to meet competition, which prevents prices for last half delivery from going above the present level in most instances, at least for the time being. The announced reduction on ore has been so fully discounted by pig iron producers for some time that it is not likely to have any apparent effect on price schedules. In fact, it is only a sentimental and not a legitimate bearing which it will have under existing conditions.

The New York State Steel Company has completed arrangements for blowing in its stock on the first of the coming month. We quote as follows for current and second quarter delivery, f. o. b., Buffalo:

No. 1 X foundry.....	\$14.00 to \$14.50
No. 2 X foundry.....	14.00 to 14.25
No. 2 plain.....	13.75 to 14.00
No. 3 foundry.....	13.50 to 13.75
Gray forge.....	13.25 to 13.50
Malleable.....	13.75 to 14.25
Basic.....	14.00 to 14.50
Charcoal.....	15.75 to 17.25

Finished Iron and Steel.—The general tone of the market has improved, the advance in bar and plate prices having had a tendency to bring out specifications on contracts terminating April 1, and to incline buyers to go ahead with orders for second quarter before prices go to any higher level. No quotations under 1.15c. Pittsburgh, are being made for steel bars nor 1.20c. for plates and shapes. It is understood that the policy of the various steel companies will be to cancel on April 1 all unspecified portions of contracts; that is, these contracts at lower than present prices will not be extended. No quotations are being made for deliveries beyond July 1. Increased business is also coming in for material used in outside work in building construction—nails, bolts, spikes, etc. The Government to-day closed bids for wing walls for the U. S. ship canal lock in Black Rock Harbor, Buffalo (the Buffalo Dredging Company being low bidder), for which a number of carloads of drift-bolts, screw bolts and spikes will be required. Bids are being received for five lift bridges to be built on section 105 of the

Erie Barge Canal; between 200 and 300 tons of concrete reinforcing bars will be required for the abutment work. The city of Rochester is asking bids for 1800 tons of riveted steel pipe, and the village of Sodus, N. Y., will soon receive bids for 6 miles of 4, 6 and 8-in. cast iron pipe for its new waterworks system. Active conditions continue in fabricated structural lines. The American Bridge Company has been awarded the steel, 500 tons, for the Auditorium and Clinic buildings for Cornell University, Ithaca, for which Metz Bros., Buffalo, hold the general contract. The Rochester Structural Steel Company has received contract for steel for the Eastman Kodak Company's factory building No. 36, Rochester, 100 tons. Bids are to be received this week for the McCurdy-Norvell Department Store Building, Rochester, 500 tons, and bids go in the fore part of this week on revised plans for the Bennett Park Technical High School, Buffalo, calling for 1100 tons.

Old Material.—The market shows continued gain, with a fair amount of inquiry coming in. Dealers are holding firmly to price schedules, but consumers are reluctant to pay prices asked, and transactions noted are in consequence not of very large volume, although dealers anticipate increased orders shortly. Material on contracts is now moving quite freely. We quote as follows, per gross ton, f. o. b. Buffalo:

Heavy melting steel.....	\$12.75 to \$13.25
Low phosphorus steel.....	15.75 to 16.00
No. 1 railroad wrought.....	14.00 to 14.25
No. 1 railroad and machinery cast scrap.....	13.50 to 14.00
Old steel axles.....	18.50 to 19.25
Old iron axles.....	22.00 to 22.50
Old car wheels.....	12.00 to 12.25
Railroad malleable.....	12.50 to 12.75
Boiler plate, sheared.....	13.75 to 14.25
Locomotive grate bars.....	11.00 to 11.25
Pipe and tank.....	9.50 to 10.00
Wrought iron and soft steel turnings.....	7.50 to 7.75
Clean cast borings.....	6.75 to 7.25

British Production Still Smaller

Pig Iron Stocks Diminishing Everywhere

(By Cable.)

MIDDLESBROUGH, ENGLAND, March 26, 1912.

The iron and steel trades are utterly disorganized. Productive operations at the various plants are diminishing daily. Prices generally are nominal because makers will not quote. It will probably take 14 days at least, after the coal miners resume, for the blast furnaces to get in full operation. Pig-iron stocks are continuously decreasing. German makers have sold blooms and billets at 99s. 3d., delivered in Lancashire. American makers have sold sheet bars at 95s., delivered at Newport for July and August. A little better inquiry is developing, but the German Steel Syndicate is not anxious to sell. We quote the market as follows:

Cleveland pig iron warrants, 51s. 7½d.
No. 3 Cleveland pig iron, makers' price, f. o. b. Middlesbrough, 52s. 3d.
German basic steel bars, f. o. b. Antwerp, £5 7s.
German sheet bars, f. o. b. Antwerp, 95s.
German 2 in. billets, f. o. b. Antwerp, 92s.
Steel bars, export, f. o. b. Clyde, £6 12s. 6d.
Steel joists, 15 in., export, f. o. b. Hull or Grimsby, £6 7s. 6d.
Steel ship plates, Scotch, delivered local yard, £7 7s. 6d.
Steel black sheets, No. 28, export, f. o. b. Liverpool, £9.
Steel rails, export, f. o. b. works port, £5 17s. 6d.
Tinplates, cokes, 20 x 14, 112 sheets, 108 lb., f. o. b. Wales, 14s. 4½d. for prompt, and 13s. 10½d. for forward delivery probable, as no reliable quotation is obtainable.

(By Mail.)

MIDDLESBROUGH, ENGLAND, March 15, 1912.

Few Blast Furnaces Running

"Stagnation complete" about describes the position of the leading iron manufacturing center of Great Britain, for of its 78 furnaces or so only half a dozen are blowing to-day. These are not running on ordinary foundry iron, and their activity is precarious because fuel is simply not to be had. Extraordinary prices have been paid for coke for damping down furnaces. In Cleveland alone about 18,000 tons was used for this purpose, and material which recently sold at 6s. 6d. a ton delivered is now held for 40s., while over in Lancashire as much as 45s. has been paid for fairly

large lots for immediate delivery. Producers who have their own coke ovens are, of course, not hit so badly as those not having self-contained works, but where material is wanted, and has had to be obtained, fancy prices have been the rule. About 250 tons per furnace is required here for damping, and the coke supplies of the district have now been cleared out.

Meantime there is a strong run on the pig iron in public stores. Makers have practically nothing to get rid of, and where buyers want supplies high premiums are asked. One favorite brand, for instance, has sold at 52s. 3d. while at the same time cash warrants were quoted at 50s. 6d., and even at the price named sellers were not anxious to book contracts. Continental buyers are rushing material out of public stores as fast as they can get it, fearing that the fuel supply, available for working the cranes and locomotives would give out before they could complete the loading of vessels which they had under charter. It will be some little time, even under the most favorable circumstances, before full production of No. 3 foundry can be restored, so that the strike is certainly a bull point for the iron market. Even now many of the leading brands are not obtainable from makers at all, and the supplies held in public stores are being rapidly diminished. As regards the Midlands, practically all quotations have been withdrawn by makers, and this is substantially the case in Scotland, where at the present moment not a single stack is in active commission.

Steel Works Closing Down

Of course it goes without saying that stagnation to an almost equal extent is in force at the steel works, whose troubles are added to by the withdrawal of literally thousands of trains and the consequent absence of facilities for sending raw material to the works and the forwarding of finished products. The railroad companies are in a state of chaos, about as bad as that during the railroad strike in August last; in fact, they had not received the leeway lost then before they were thrown into hopeless disorganization by the strike of the colliers.

The dislocation of industry has been felt with fullest force among the finishing sections. In the tinplate trade, for instance, out of 569 miles in Wales, only 61 are now at work and the majority of these will stop this week, not so much because of the shortage of fuel as of the difficulty of obtaining steel. At present most works are carrying on operations in the tin houses, but the working off of the stocks of black sheets between the mills and the pots only takes a few days, and when this has been accomplished a few thousand more workers will swell the ranks of the unemployed. To-day 11 of the Welsh steel works are closed, but the Elba plant at Gowerton, belonging to Baldwins, Ltd., can run for a little longer. Prices, of course, are nominal for all descriptions of material.

New York

NEW YORK, March 27, 1912.

Pig Iron.—Eastern melters are taking much more interest in the situation, and inquiry has increased decidedly. The possibility of a coal strike, the difficulties in securing prompt car service and the improving demand for their own products have caused pig iron consumers to take closer account of the stock in their yards and under contract, and a disposition is now shown to purchase not only for the second quarter, but for the third quarter and even through the whole of the last half. Pennsylvania and New Jersey furnaces are exceedingly careful in committing themselves as to contracts extending much into the future because of the uncertainty as to their furnace operations, being unable to accumulate any stocks of fuel. Some important furnace operators report that they have not more than a two weeks' supply of fuel. Transactions have consequently been limited in this territory because of the peculiar conditions existing. The question of pig iron prices for the third quarter and last half is naturally the subject of much discussion because of the heavy reduction in Lake Superior ores, but the argument by consumers of pig iron that prices should be reduced to correspond takes no cognizance of the evident fact that pig iron prices have for the past year been discounting reductions in cost through cheaper raw material. On the other hand, furnace companies which have stiffened their views as to pig iron prices find that occasionally they are able to make sales at the higher rates asked, thus showing that the pig iron market is on a firm basis with a tendency to advance.

A feature of the foundry trade is the activity in purchases of foundry coke. Large contracts have been placed for deliveries extending through the 12 months beginning July 1 on the basis of about \$2.25 per net ton at oven in the Connellsville region. We quote as follows for Northern iron at tidewater: No. 1 foundry, \$15.25 to \$15.75; No. 2 X, \$15 to \$15.50; No. 2 plain, \$14.75 to \$15. We quote Southern iron at \$15 to \$15.25 for No. 1 foundry and \$14.75 to \$15 for No. 2 foundry.

Finished Iron and Steel.—The steady movement of business, with numerous signs of awakening demand with the opening up of spring operations, has acted further to encourage the favorable sentiment exhibited last week with resultant stiffening in prices. Much of the business in plates is being placed at 1.20c., Pittsburgh, basis, although 1.15c. can be done on attractive business and 1.15c. is now more generally the minimum for shapes with some of the larger companies asking 1.20c. The lower price could, however, be shaded for large straight propositions. Bar iron has similarly strengthened and is firm at 1.20c. at mill. Not many large projects in the structural field have yet reached the point of asking for bids and there is still a large total of work pending. Between 1000 and 1500 tons of steel bars were closed for an Atlantic City pier at 1.10c., Pittsburgh basis, it is claimed. Prices for fabricated material have apparently not yet fully responded to the betterment in plain material, and this is particularly true of the New England territory. As relating to the general situation, mention should be made of a number of cases where railroads have asked for bids on structural material and on bars for delivery not only throughout 1912, but also through 1913 and into 1914. These are naturally taken to indicate that the railroads regard the market as surely having passed the low point. Additional subway work in New York will probably shortly be put on the market, and in addition to structural projects enumerated in late issues, there are pending two bridges for the Maine Central, 150 tons; a theater in Brooklyn, 500 tons, and a boiler house for the Metropolitan Museum of Art, 600 tons. The Bethlehem Steel Company has been given 100 tons of the Boston Transit work; the American Bridge Company has 1000 tons for the Albany High School; the Alfred E. Norton Company has 1200 tons for a loft building on Seventh avenue and Fourteenth street; the Fort Pitt Bridge Works is understood to have 6000 tons of fabricated work for the Long Island Railroad, with deliveries extending into 1914, and the Eastern Steel Company has 200 tons for an electric railroad bridge in New Jersey. One unusually interesting project, involving 600 tons, is probably closed at this writing for a Southern paper mill near Mobile, Ala., Joseph H. Wallace, engineer. Here the waste material of pine saw mills will be utilized for paper making and by-products of the paper making process will be recovered, such as turpentine and resin. Quotations are: Steel bars, 1.26c. to 1.31c.; plain structural material and plates, 1.31c. to 1.36c.; bar iron, 1.30c. to 1.35c., all New York. Plain material from store, New York, 1.65c. to 1.75c.

Cast Iron Pipe.—Private buying continues in good volume, but no public lettings of importance are at present in sight. The New York City requirements have not yet been made known. Prices on carload lots of 6 in. are still quoted at \$22 to \$23, tidewater, per net ton.

Old Material.—Dealers are buying in considerable quantity to cover contracts with rolling mills made some time ago, but neither rolling mills nor steel companies are in the market to any extent for additional supplies. General trade is moderately active, but prices do not seem to harden, as consumers resist any advance because of the low prices prevailing on their own contracts. Quotations are as follows, per gross ton, New York and vicinity:

Old girder and T rails for melting.....	\$9.50 to \$10.00
Heavy melting steel scrap.....	9.50 to 10.00
Relaying rails	20.00 to 20.50
Rerolling rails (nominal)	11.75 to 12.00
Iron car axles.....	18.50 to 19.00
Old steel car axles.....	13.50 to 14.00
No. 1 railroad wrought.....	12.00 to 12.50
Wrought iron track scrap.....	11.00 to 11.50
No. 1 yard wrought, long.....	10.50 to 11.00
No. 1 yard wrought, short.....	9.50 to 10.00
Light iron	4.25 to 4.75
Cast borings	6.00 to 6.50
Wrought turnings	6.75 to 7.00
Wrought pipe	9.75 to 10.00
Old car wheels (nominal)	11.50 to 12.00
No. 1 heavy cast, broken up.....	11.00 to 11.50
Stove plate	8.75 to 9.00
Locomotive grate bars.....	9.00 to 9.50
Malleable cast	9.00 to 9.50

Boston

BOSTON, MASS., March 26, 1912.

Old Material.—Despite a fortnight of much improved sentiment in the scrap market transactions have been few and for the most part unimportant and quotations have not advanced. The prices quoted below are those offered by the large dealers to the producers and to the smaller dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points taking Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of \$2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices.

Heavy melting steel.....	\$8.75 to \$9.00
Low phosphorus steel.....	11.45 to 11.95
Old steel axles.....	14.00 to 14.50
Old iron axles.....	17.00 to 18.00
Mixed shafting.....	13.00 to 13.50
No. 1 wrought and soft steel.....	10.00 to 10.50
Skeleton (bundled).....	7.00 to 7.50
Wrought iron pipe.....	8.50 to 9.00
Cotton ties.....	7.00 to 7.50
No. 2 light.....	4.50 to 5.00
Wrought turnings.....	6.00 to 6.50
Cast borings.....	5.50 to 6.00
Machinery, cast.....	12.50 to 13.00
Malleable.....	8.75 to 9.25
Grate bars.....	6.00 to 6.50
Stove plate.....	8.00 to 8.50
Cast iron car wheels.....	11.75 to 12.00

Metal Market

NEW YORK, March 27, 1912.

The Week's Prices

		Copper, New York.		Tin.		Lead.		Spelter.	
Mar.	Lake.	Electro-lytic.	New York.	New York.	St. Louis.	New York.	St. Louis.	New York.	St. Louis.
21.....	14.87½	14.75	42.10	4.20	4.12½	6.95	6.80		
22.....	15.00	14.87½	42.30	4.20	4.12½	6.95	6.80		
23.....	15.12½	14.87½	4.20	4.12½	6.85	6.70		
25.....	15.37½	15.25	42.90	4.20	4.12½	6.80	6.65		
26.....	15.50	15.37½	43.37½	4.20	4.12½	6.75	6.60		
27.....	15.50	15.37½	43.37½	4.20	4.12½	6.75	6.60		

Copper is strong, and has at last gone above 15c. Tin steadily advanced during the week. Lead was advanced to points March 21 and is firm. Spelter is more freely offered and weaker. Cookson's antimony has been advanced to 8c. and other brands are higher.

New York

Copper.—Since the latter part of last week copper has been firm on a 15c. basis for the first time in almost five years. Following a good demand from American consumers and also for export last week, the metal started upward and has held its own despite a subsidence of the heavy buying. Influences which augmented the upward trend were speculation and the fact that stocks are extremely low. The market on March 22, when the advance commenced in earnest, was feverish and on that day 15c. and over was reached for electrolytic. After buying on the rising market, as is their habit, consumers then practically withdrew. Electrolytic is quoted to-day at 15.37½c. and higher for early delivery, although the price is largely nominal. Lake copper is quoted to-day at 15.50c. The price of copper in London this morning was £68 5s. for spot and £69 2s. 6d. for futures. The exports of copper this month have been 22,105 tons.

Pig Tin.—The week in tin has been quiet, although there has been a steady and almost daily advance in price and to-day 43.37½c. is quoted for early delivery. There has been a continuance of sales of tin on the Metal Exchange. On March 22, 50 tons were sold on the Exchange for April delivery at 42c. and 25 tons for August delivery at 41.10c. March 25 225 tons were sold on the Exchange, all for future delivery, at 41.75c. The sale of Banca tin in Amsterdam, Holland, to-day realized 120½ florins, equivalent to about 43.95c. per lb. c.i.f. New York. There were sold 2700 tons and the price is extremely favorable. Spot tin is quoted in London to-day at £196, futures, £191 10s. The arrivals of tin this month have been 2575 tons and the amount afloat is 3755 tons.

Tin Plates.—The price of tin plates laid down at Swansea, Wales, has been advanced 4½d., the price now being 13s. 10½d., as a result of the coal miners' strike. The price of 100-lb. coke plates continues at \$3.54, New York. Conditions otherwise are unchanged.

Lead.—There has been considerable activity in lead and both the American Smelting & Refining Company and the independent companies have been booking business on a large scale. On March 21 the former advanced its New York price from 4.10c. to 4.20c. Its

St. Louis price is 4.12½c., although independents have done a good business at prices ranging from 4.17½c. to 4.25c., St. Louis, with the bulk of the business ranging from 4.17½c. to 4.25c. Further advances in the price of lead are anticipated.

Spelter.—There has been a lessening of activity with a decline in prices in the spelter market as results of the needs of consumers having been satisfied in the last few weeks. For early delivery 6.75c., New York, is asked, with corresponding prices in St. Louis.

Antimony.—All brands of antimony have been advanced substantially. Prices which have been somewhat erratic in the last few weeks are now quoted as follows: Cookson's, 8c.; Hallett's, 7.75c.; Hungarian and Chinese grades, 7.25c.

Old Metals.—The market is strong at the following selling prices:

	Cents per lb.
Copper, heavy and crucible.....	14.25 to 14.75
Copper, heavy and wire.....	14.00 to 14.50
Copper, light and bottoms.....	13.00 to 13.25
Brass, heavy.....	9.25 to 9.50
Brass, light.....	7.25 to 7.75
Heavy machine composition.....	11.75 to 12.00
Clean brass turnings.....	8.50 to 9.00
Composition turnings.....	10.00 to 10.50
Lead, heavy.....	3.75
Lead, tea.....	3.50
Zinc, scrap.....	5.25

St. Louis

MARCH 25.—The metal market has been rather quiet; firm in some lines, weaker in others. Tin is quotable to-day at 43.35c. as the top price for spot; Lake copper, 15.45 to 15.70c.; electrolytic copper, 15.35c. to 15.60c.; Cookson's antimony, 7.97½c.; lead, higher than last week, but quiet for the moment at 4.20 to 4.25c.; spelter, considerably easier, at 6.50c. to 6.60c. In the Joplin mining district the best basis price for 60 per cent. grades was \$52, with a range down to \$48 per ton. The highest grades reached \$55. The output is above 5500 ton per week now, almost record-breaking. Calamine was in strong demand, but little was procurable. Lead ore ranged from \$50 to \$54 and rather weak. On miscellaneous scrap we quote: Light brass, 5c.; heavy brass and light copper, 9c.; heavy copper and copper wire, 10c.; zinc, 3.50c.; lead, 3.50c.; pewter, 21c.; tinfoil, 31c.; tea lead, 3c.

Iron and Industrial Stocks

NEW YORK, March 27, 1912.

The stock market has been buoyant, with sharp advances on many industrials. An especially active movement has occurred in the American Can stocks. Both the common and preferred have scored heavy advances in the expectation that an arrangement is to be made to pay off the accrued dividend on the preferred within the next couple of years. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chalm., com....	3¼ - 1	Pressed Steel, com....	33¼ - 35¼
Allis-Chalm., pref....	3¼ - 4¼	Pressed Steel, pref....	101¼ - 102
Bald. Loco., com....	50¾ - 51	Railway Spring, com. 31 - 33	
Bald. Loco., pref....	104¾ - 105	Railway Spring, pref. 100½ - 101	
Beth. Steel, com....	30¾ - 32¾	Republic, com....	21½ - 23
Beth. Steel, pref....	60 - 63¾	Republic, pref....	73 - 74¾
Can, com....	16¾ - 23¼	Sloss, com....	46 - 49¼
Can, pref....	97½ - 106¾	Pipe, com....	16 - 16½
Car & Fdry, com....	55¾ - 58	Pipe, pref....	53 - 53¾
Car & Fdry, pref....	117 - 117¾	U. S. Steel, com....	66¾ - 70¼
Steel Foundries....	30¾ - 32	U. S. Steel, pref....	111¾ - 113¾
Colorado Fuel....	27 - 30	Westinghouse Elec. 74¼ - 80	
General Electric....	165¼ - 167¾	Va. I. C. & Coke....	60¼ - 64¼
Gr. N. Ore Cert....	39¾ - 42	Am. Ship, com....	47
Int. Harv., com....	111¾ - 117	Am. Ship, pref....	103 - 103¾
Int. Pump, com....	30 - 31¼	Chic. Pneu. Tool....	46 - 50
Int. Pump, pref....	81¼ - 82¾	Cambria Steel....	42 - 42¾
Lackawanna Steel....	29	Lake Sup. Corp....	28½ - 30
Locomotive, com....	37¾ - 40	Warwick.....	10½ - 10¾
Locomotive, pref....	107 - 109	Crucible Steel, com. 11¼ - 12¼	
Nat. En. & St., com. 15¼ - 17¾		Crucible Steel, pref. 82¼ - 84	
Nat. En. & St., pref. 93 - 93½			

The Union Trust Company, Pittsburgh, has purchased \$5,000,000 first mortgage 5 per cent. bonds of the Jamison Coal & Coke Company. Dated April 1, 1912, they will run for 10 years and have a minimum sinking fund of \$300,000 per year. They can be called at 105. They will be first lien on 5350 acres of 11-ft. vein of coal, with all improvements, in the Greensburg basin, in Westmoreland County, Pa.

The American Rolling Mill Company has sold to Beeker & Co., Chicago, \$1,300,000 5 per cent. notes, due in two to three years.

Dividends Declared

The Western Electric Company regular quarterly, \$2 a share, payable March 30.

The American Wringer Company regular quarterly, $1\frac{1}{2}$ per cent. on the common and $1\frac{3}{4}$ per cent. on the preferred, payable April 15.

The Dominion Steel Corporation regular quarterly, 1 per cent., payable April 1.

The American Locomotive Company regular quarterly, $1\frac{3}{4}$ per cent. on the preferred, payable April 22.

The Boston Belting Company regular quarterly, \$2 per share, payable April 1.

The American Rolling Mill Company, quarterly, 3 per cent., on the common and $1\frac{1}{2}$ per cent. on the preferred stock, payable April 15.

The Vulcan Detinning Company regular quarterly, $1\frac{3}{4}$ per cent., on the preferred stock, payable April 20.

The Union Typewriter Company regular semi-annual, $3\frac{1}{2}$ per cent., on the first preferred and 4 per cent. on the second preferred stock, payable April 1.

The General Fireproofing Company regular quarterly, $1\frac{3}{4}$ per cent. on the preferred stock, payable April 1.

Personal

John M. Manley, civic secretary of the Business Men's Club, Cincinnati, Ohio, and who was local secretary of the National Metal Trades Association for eight years, has resigned his position with the club to become connected with the Hisey-Wolf Machine Company, a Cincinnati manufacturer of electric tools. He will have the official title of secretary and will have general charge of the company's business.

George Langen, general superintendent Cincinnati Planer Company, Cincinnati, Ohio, who was to have sailed from New York March 19, for an extended European trip, was delayed on account of a severe attack of appendicitis. His condition at the present time is very much improved.

Robert H. Irons has been appointed general superintendent by the receivers of the Central Iron & Steel Company, Harrisburg, Pa.

C. F. Succop has been appointed general sales manager of the Ideal Electric & Mfg. Company with headquarters at Mansfield, Ohio.

H. L. Bringer has been appointed assistant superintendent of the Ohio Works blast furnaces of the Carnegie Steel Company at Youngstown, Ohio. He has been chief chemist at these furnaces for some years.

George W. Hannan has been made general manager of the three plants of the Phillips Sheet & Tin Plate Company, with headquarters at Weirton, W. Va., where one of the plants is located. Edwin W. Jones, formerly superintendent of the Pope plant at Steubenville, Ohio, has been promoted to be general manager of that plant, succeeding Mr. Hannan. James Johns will succeed Mr. Jones as superintendent of the Pope plant. The third plant of the company is located at Clarksburg, W. Va.

N. P. Turner has resigned his position as chief engineer of the Cuba Railroad. In association with L. D. Moore, of New York, he will take up mining and general engineering and exploration work in the West Indies, Central and South America, with headquarters for the present at Hotel Camagüey, Camagüey, Cuba.

Frank D. Chase, architect of the Western Electric Company, has opened offices in the People's Gas Building, Chicago, for the practice of architecture and industrial engineering, making a specialty of manufacturing plants and mercantile buildings.

E. Arthur Tutein, who has been representing Crocker Brothers in the New England territory for the past eight years, has severed the connection and has opened an office in the Exchange Building, 53 State street, Boston, Mass., to trade in pig iron, coal, coke and metals.

H. H. Miller, president of the Miller-Owen Electric Company, Pittsburgh, has resigned. His duties are being attended to for the present by J. D. Crawbuck, vice-president.

F. W. Hutchings, who recently resigned as secretary of the National Founders' Association to become treasurer of the Lake Superior Iron & Chemical Company, Detroit, was elected a director of the company at a stock-

holders' meeting in New York March 20. He succeeds Thomas McDougall, retired. Harry Moore, Chicago, was added to the board. F. W. Blair, president of the Union Trust Company, Detroit, was elected chairman of the board of directors and of the Executive Committee.

W. S. Pilling, of Pilling & Crane, Philadelphia, Pa., has returned from a month's vacation in the South.

W. E. Hartman, mechanical engineer for H. Koppers, Joliet, Ill., read a paper before the Illinois Gas Association, Chicago, March 20, on the Koppers horizontal cross regenerative gas ovens in Vienna, Austria.

E. M. Taussig, Philadelphia, Pa., until recently associated with Janney, Steinmetz & Co., has opened an office in the Drexel Building as sales agent in that city and vicinity for the Pittsburgh Screw & Bolt Company, Pittsburgh, and the Slatington Rolling Mills, Slatington, Pa.

The Brier Hill Steel Company, Youngstown, Ohio, has appointed H. Z. Bixler chief engineer and J. E. Daley chief civil engineer of the new steel plant. C. B. Whitson, of Indianapolis, becomes connected with the sales department and will give special attention to handling the sales of Lohmannized sheets made by the company. Mr. Bixler was formerly chief engineer of the Republic Iron & Steel Company and Mr. Daley was formerly connected with the Ohio works of the Carnegie Steel Company at Youngstown.

Obituary

DAVID A. DANGLER, father of the vapor stove industry, died at his home, Cleveland, Ohio, March 25, aged 89 years. He was born in Newmanstown, Pa. In 1852 he located in Cleveland, where he was engaged in the wholesale hardware business for several years under the firm name of Tennis & Dangler. Later, after several years in the East in the shoe manufacturing business, he returned to Cleveland to re-enter the hardware business, but saw the possibilities of the vapor stove, and 32 years ago became interested in the manufacture of what was practically the first gasoline stove on the market under the name of the Hull Vapor Stove Company. This company passed out of existence in a few months, and Mr. Dangler organized the Dangler Vapor Stove & Refining Company, to manufacture stoves and refine gasoline. Later the name of the company was changed to the Dangler Stove & Mfg. Company. About ten years ago he conceived the idea of organizing the present American Stove Company, and spent a year or more in working on plans for the consolidation of vapor and oil stove interests that now are a part of that company. He leaves two sons, Charles I. Dangler, retired, and D. Edward Dangler, manager of the Dangler Stove Company, and one daughter, Miss Clara Dangler.

ELIAS G. HELLER, president of the Heller Brothers Company, Newark, N. J., died March 22, aged 75 years. He was born in Newark and at the age of 16 entered the employ of Charles Tiffany, New York. Ten years later he went to work with his father in making files and rasps in West Orange. In 1865 Mr. Heller and his brothers, Peter and Lewis, organized the firm of Heller Brothers. The growth of the establishment compelled its removal to larger quarters and the industry was located at Woodside, a Newark suburb, in 1872. Lewis withdrew in 1870 and Peter in 1880. Two other brothers, George and John, took their places in the firm which was subsequently incorporated. Mr. Heller had served as alderman of his city and was one of the founders of the Women's and Children's Hospital, continuing its president until his death. In 1886 he was president of the File Manufacturers' Association of the United States. He was a member of a number of social organizations and was long the president of the board of trustees of the Forest Hill Presbyterian Church. He leaves a widow and three sons.

ROBERT F. McKENNA, formerly master car builder of the Delaware, Lackawanna & Western Railroad and a past president of the Master Car Builders' Association and of the Central Railway Club, died last week in Philadelphia from the effects of a surgical operation. He was born in 1868 in Scranton, Pa., entered the railroad shops there as an apprentice in 1884 and won his way on his merits to the position of master car builder.

WILLIAM G. SAWYER, Carpentersville, Ill., died March 14, at his home in Elgin, aged 71 years. His business career began as a clerk in a general store in Carpentersville, and in the course of time he bought the business. With his brother, Henry G. Sawyer, he started a shop several years later for making plowshares. This was the beginning of the Star Mfg. Company, whose plant at Carpentersville is now of great extent. Mr. Sawyer was an officer and director of the company from its beginning and was president at the time of his death.

Pittsburgh and Vicinity Business Notes

The second annual banquet of employees of the Westinghouse Companies was held in the Fort Pitt Hotel, Pittsburgh, on the evening of March 15, about 500 officials and employees being present. Following is a list of the speakers and their subjects: Toastmaster, E. M. Herr, president Westinghouse Electric & Mfg. Company; Col. H. G. Prout, vice-president and general manager Union Switch & Signal Company, "Co-operation;" A. L. Humphrey, vice-president and general manager Westinghouse Air Brake Company, "The Power of Air;" T. E. Clifford, general agent Pittsburgh Meter Company, "Gas;" ex-Mayor George W. Guthrie, "Pittsburgh;" Guy E. Tripp, chairman board of directors Westinghouse Electric & Mfg. Company, "Public Relations;" J. J. Jackson, attorney Westinghouse Electric & Mfg. Company, "Entropy;" E. H. Sniffin, sales manager Westinghouse Machine Company, "Steam."

An adjourned meeting of stockholders of the Westinghouse Air Brake Company will be held in Wilmerding, Pa., April 24, for the purpose of voting on a proposed increase in the capital stock.

The skelp mill at the South Sharon works of the Carnegie Steel Company was scheduled to be put in operation March 25, after being idle for about two years. Its output will be about 10,000 tons per month.

The Shenango Furnace Company, Oliver Building, Pittsburgh, operating three blast furnaces at Sharpsville, Pa., has opened an office on the sixteenth floor of the Rockefeller Building, Cleveland, Ohio. W. F. Riley, formerly fleet engineer of the Shenango Steamship Company, an identified interest, has been promoted to superintendent of the fleet, comprising five ore boats. C. J. Peck, Washington, D. C., has been appointed assistant fleet superintendent in charge of traffic.

The Mesta Machine Company, Oliver Building, Pittsburgh, works at West Homestead, Pa., has received an order from the Pennsylvania Steel Company for an 800-ton steam hydraulic forging press of the Haniel & Lueg type, of which the company is the sole manufacturer in the United States and Canada. The press will be used for commercial forging. The company also has an order from the Follansbee Brothers Company, Pittsburgh, for a pair of 26 x 42-in. piston valve reversing engines, geared 1 to 2, the gears being of cast steel with cut teeth. The engine will be used to drive the blooming mill in the open-hearth steel plant at Follansbee.

The McClintock-Sprague-Wilhelm Company, Pittsburgh, has applied for a charter to engage in the manufacturing and jobbing of tin and sheet iron ware, miners' and mining supplies, hardware sundries, etc. The incorporators are Roy McClintock, George H. Sprague and S. P. V. Wilhelm, all of Pittsburgh.

On April 1 the offices of the Pope Tin Plate Company will be removed from Pittsburgh to Weirton, W. Va., and combined with the offices of the Phillips Sheet & Tin Plate Company at that place. C. E. Pope has resigned as president of the Pope Tin Plate Company, while J. F. Craft, secretary and treasurer, and G. W. Hannan, general manager, will probably continue in the service of the Phillips Company.

Samuel W. Hay's Sons, manufacturers' agents, Keenan Building, Pittsburgh, now represent the Ohio Crane Company, builder of locomotive cranes, and the Hall Gas Engine Company, Bucyrus, Ohio.

E. J. Deckman, Oliver Building, Pittsburgh, has received a contract for a 2000 hp. Hoppes open exhaust steam water heater and purifier to be installed in the power house of the Atlas Coal Company, Burgettstown, Pa.

The Ohio Seamless Tube Company, Shelby, Ohio, states that it has no plans for extensions to its works and is not contemplating going into other products.

The American Radiator Company has leased the ground floor of a large building at Wood street and Third avenue, Pittsburgh, to be used as show rooms.

The contract for the new machine shop to be built by the H. K. Porter Company, Pittsburgh, builder of light locomotives, has been placed with the Pittsburgh Construction Company, and the steel, about 800 tons, will be furnished by the American Bridge Company.

H. F. Fraenheim has been appointed receiver of the Vanadium Mines Company, Pittsburg. The company's mines are at Cutter, New Mexico, and an effort will be made to raise sufficient money to develop them.

The Engineers' Society of Western Pennsylvania held its monthly meeting in the Oliver Building, Pittsburgh, on the evening of March 19. A paper entitled "Safety Considerations in Industrial Engineering" was presented by Davis S. Beyer, chief safety inspector of the American Steel & Wire Company, who treated his subject under the following heads: Relation of the accident problem to engineering; need for standardizing; safety specifications; protection of gearing; electrical apparatus; general power transmission and distribution; set screws; ladders, walks, etc. The author showed a large number of lantern slides, illustrating various types of safety devices in actual operation.

The Pennsylvania Tank Car Company, Sharon, Pa., has placed a contract for a new building, 40 x 250 ft., which will be equipped with machinery for the manufacture of steel tank cars. This will add largely to the capacity of the company, which reports enough orders on hand to keep its plant running full for several months.

The United States Steel Railway Tie Company, Oliver Building, Pittsburgh, may build a plant in that city to manufacture steel ties. In case this is not done a manufacturing arrangement will be made with some concern.

The Westinghouse Electric & Mfg. Company will erect at East Pittsburgh a reinforced concrete building, 70 x 161 ft., three stories with basement, to be used for oil storage.

The Pittsburgh Screw & Bolt Company, Pittsburgh, has received a contract for 600 tons of bolts, twisted rods and other material for a new dock at the Soo Canal.

Application for a charter for the Wilson-Snyder Centrifugal Pump Company has been made by Henry D. Wilson, Thomas D. Gillespie, and H. S. McKinley, incorporators, all of Pittsburgh, for the purpose of manufacturing and selling centrifugal pumps, engines, turbines and other machinery.

The rebuilt 6-mill plant of the Washington Tin Plate Company, Washington, Pa., is now in full operation. In the tin house a new practice has been adopted which considerably increases the capacity. J. J. O'Connor is president and A. A. Vilsack is treasurer. The directors also include E. R. Crawford, J. G. Vilsack and H. J. Dallmeyer. Mr. Crawford is also president of the McKeesport Tin Plate Company, McKeesport, Pa. E. T. McNulty is general manager. The rated capacity of the remodeled plant is 1500 boxes per day.

Nothing definite has been accomplished in the proposed merger of the Phillips Sheet & Tin Plate Company and the La Belle Iron Works. The La Belle Iron Works is capitalized at \$10,000,000. It is proposed to issue \$5,000,000 new stock, from which a dividend of 20 per cent. would be paid, and \$3,000,000 of the stock is to be given for the Phillips Company. The new corporation, to take over the properties of the La Belle Iron Works and the Phillips Company, it is proposed to capitalize on the basis of \$15,000,000 preferred and \$15,000,000 common stock. This would give the present holders of La Belle Iron Works securities one and one-fifth shares of common stock and one and one-fifth shares of preferred stock for every share of their La Belle stock.

The Standard Underground Cable Company, Pittsburgh, will erect a building, 40 x 100 ft., two stories, to be used as a machine shop for the manufacture of terminals and junction boxes used in connection with underground cables. It will be equipped with special machinery for its purposes.

The Standard Bridge Tool Company, Bessemer Building, Pittsburgh, has installed for the Pittsburgh Bridge & Iron Company, Rochester, Pa., a Thomas spacing table and punch, designed to meet the demand for a quick-acting spacer for light work and containing some new features. It has also sold a Thomas spacing table of the quick-acting type with multiple punch to the Berger Iron Company, Akron, Ohio.

Samuel W. Hays Sons, Keenan Building, Pittsburgh, have installed a trolley system at the plant of the Central Tube Company, Economy, Pa.; five-ton crane system for Morgantown University; three Whiting electric traveling cranes—one of 20-ton capacity and two of 10-ton—for the United States Cast Iron Pipe & Foundry Company's Scottsdale plant, and three hammer cranes for the Titusville Forge Company, Titusville, Pa.

The Erie City Iron Works, Erie, Pa., through its Pittsburgh representative, T. H. McGraw, Jr., has received a contract for the power plant equipment of the Atlas Coal Company. This is a new coal company in the Pittsburgh district. Geo. Z. Hosack is president and associated with him are J. B. Haines, Jr., and John Bell. The power plant will include four 300-hp. water-tube boilers for 180 lb. steam, two 300-hp. engine generator sets and two 300-hp. fan engine sets. Four-valve engines for both generator and fan engines are to be used. Electric gathering locomotives will form a part of the plant equipment.

New Publications

The Heat Treatment of Tool Steel. By Harry Brearley, author of "The Analytical Chemistry of Uranium," and (with Fred Ibbotson, B. Sc.) of "The Analysis of Steel Works Materials," etc. Cloth, 160 pages. Publishers, Longmans, Green & Co., 39 Paternoster Row, London. Price, 10s, 6d.

In 13 chapters, with appendix, Mr. Brearley presents in a most enlightening manner the changes and properties induced in tool steel by heating and cooling. The work is in no part abstruse, as it was written to enlighten the artisan and foreman who have to do with the working of steel, and also for the merchant, works representative and others who may be called upon to explain the mode of treatment or character of steel, yet whose daily experience does not make them familiar with those details of the subject. There are 143 excellent illustrations in the book. Beginning with the structure and classification of tool steel, the subject is expounded as to fractures and external appearance, forging, annealing, physical changes, hardening, tempering, straightening, hardening typical tools, defects, appliances, pyrometers, case hardening and alloy steels. All except the last chapter are devoted to the ordinary type of tool steel. In the last chapter the author discusses the uses of tungsten and chromium to produce high speed tool steel and, as in previous chapters, describes methods and results and indicates the errors to be avoided. The appendix is devoted to cupped wire, apparatus for making thermal curves, grinding sparks, a brief history of steel hardening and some useful tables.

Works Management. By William Duane Ennis, M. E., professor of mechanical engineering in the Polytechnic Institute of Brooklyn; author of "Linseed Oil: An Industrial Manual." Cloth, 194 pages. Publisher, the McGraw-Hill Book Company, New York. Price, \$2.

Professor Ennis's work ably presents the underlying principles of factory administration. In his preface the writer observes: "There are industrial management problems to be attacked by other methods than those which have had widespread recent discussion." He pays a tribute to the work and conclusions of F. W. Taylor, but says that the book is not, other than incidentally, a presentation of what he terms "Taylorism." In his opening chapter Professor Ennis points out that management is rather an art than a science and that the attempt to "reduce management to a compact and complete body of rules and principles is chimerical and any attempt to do so must fail." He explains, however, that as in all arts there are "certain established methods, customs and expressions, defined things to be observed or avoided," which it is entirely feasible to present in orderly form, all with a view of effecting an end with economy of means. Chapters are devoted to management

units, cost elements and classifications, statistical records, labor, material, burden, depreciation, industrial organization, principles of accounting and plant and the physical basis of the industry. At the end of the volume are a number of exercises or problems for use if the book is used in the classroom. It is unquestionably a valuable contribution to business literature.

Applied Methods of Scientific Management. By Frederic A. Parkhurst, M. E., organizing engineer. Cloth; 325 pages; illustrated with 48 figures and 9 plates. Publishers, John Wiley & Sons, 43 East Nineteenth Street, New York. Price, \$2.

This work is an amplification of the author's article, "Applied Methods of Scientific Management" which appeared in *Industrial Engineering* in the last nine months of the year 1911. It is based on the application of methods as applied to the Ferracute Machine Company, Bridgeton, N. J., maker of presses and dies. The details of this application are not only thoroughly given, but in connection with each item a discussion is entered into of the reasons for the procedure followed and of principles of management which may have a bearing upon their more general application. The work is thus quite an elaborate study of scientific management and will be found of interest and value by those who are seeking information on this subject for the purpose of improving their own methods. An appendix contains much new matter, not included in the original publication, furnishing the organization record of the Ferracute Machine Company, commencing May, 1907. This appendix gives instructions governing each department of the shop, together with illustrations of the various forms used. It comprises about 120 pages. An index facilitates reference to the various topics considered.

The Metallurgy of Iron and Steel—Second Edition.

By Bradley Stoughton. Pages, 537; 6 x 9 in. Illustrations, over 300; tables, 34. Price, \$3. Published by the Hill Publishing Company, New York.

The first edition of this excellent textbook on iron and steel and the processes of their manufacture was reviewed in *The Iron Age* of April 9, 1908. At that time it was said that the author had succeeded well not only in producing an iron and steel textbook for students in metallurgy but in furnishing a comprehensive reference work for those engaged in related fields of engineering. The success of the work has been what was then predicted. But history has been making rapidly in the past four years and the author has recognized the necessity for something more than the revision commonly involved in bringing out a new edition. He refers in his preface to the second edition to the fact that every department of manufacture has been improved in practice, in minor respects at least, while the duplex and special open hearth processes, electric smelting and refining, use of dry blast, case hardening, etc., have been advanced sufficiently to warrant an entire re-writing of the sections devoted to them.

In addition, more or less extensive changes have been made in all the text so that there has been an entire re-setting of the type. For the edition before us the theory and chemistry of the Bessemer and open hearth processes have been rewritten and enlarged and the chapter on malleable cast iron has been made new. Portions of two chapters dealing with fuel have been merged and with other matter constitute a new chapter on "Metallurgical Fuels." The number of illustrations has been increased to more than 300 and the number of pages from 500 to 537. It is highly creditable that the author and publisher have spared neither the pains nor the expense required to put this book abreast of current practice in American iron and steel manufacture and at the same time to retain the textbook character and proportions that made the original volume a unique addition to technical literature.

Engineering Directory. Edition of 1912, leather, 1496 pages. Published by the Crawford Publishing Company, 537 South Dearborn street, Chicago. Price, \$5.

The 1912 edition of the Engineering Directory, now in its nineteenth year of publication, needs little testimony as to its usefulness. The value of the volume as a reference book is best indicated by a partial indication of its contents. These include a list of jobbers and dealers in the United States in supplies, tools and machinery in mill, steam, min-

ing, heating and lighting lines; a list of jobbers in plumbing, steam and gas fitting supplies in the United States, also in Canada; wholesale dealers in hardware and electrical supplies in the United States and Canada; a list of manufacturers' agents and of manufacturers of plumbing, heating, lighting, mill, steam and mine supplies in the United States; a list of railroad purchasing agents in the United States, Canada and Mexico; a list of the leading architects in the United States and also lists of electric lighting and power plants in the United States and Canada, gas companies and water works in the United States and an extensive list of trade associations and their officers. The book commends itself as a handy desk volume, so small that it may be slipped in the pigeonhole of a desk.

A chart showing the interior of a submarine boat has been published by the Norman W. Henley Publishing Company, 132 Nassau street, New York City. It measures 14 x 28 in. and every detail of the boat is accurately drawn to scale. An accompanying reference list gives the names of the 200 numbered parts. The price of the chart is 25 cents.

Safety in Engineering

Recent Developments in Connection with Machinery Operation

"Safety As Applied to Engineering" was the subject of an interesting address given before the Cleveland Engineering Society, March 12, by C. Eugene Pettibone, safety inspector of Pickands, Mather & Co., Cleveland, and formerly district inspector of the American Steel & Wire Company. In connection with this address Mr. Pettibone illustrated various safety devices by the use of lantern slides. Using the ratios published in 1908 by the United States Bureau of Labor the speaker estimated that there were approximately 40,000 fatal accidents last year, adding that conservative estimates give 500,000 as the number of non-fatal accidents. He considered that 50 per cent. of these are preventable. "The greatest problems to-day before the engineering profession in all of its phases of work are higher efficiency and reduction of waste," said Mr. Pettibone.

Machinery a Prolific Cause of Accidents

The safety problem he divided roughly into three parts, viz.: machinery (installation and design), power equipment and construction. Machinery was referred to as a very prolific cause of accidents, most of which may be traced to the following dangerous mechanical elements which are found in machinery and its appliances: First, all engaging gears, rolls and drums; second, shafting and spindles and all couplings or all projections thereon, or upon reciprocating or other revolving parts of machines; third, belts, bands and driving chains; fourth, the spaces between fixed and moving parts of any machine or between the latter and structures near it, leaving insufficient working clearance; fifth, flywheels and balance wheels; sixth, counterweights and other suspensions.

"It has been estimated," said the speaker, "that projecting set screws yearly cause 1500 accidents. In every case they should be eliminated or guarded. Shafting couplings should have perfectly smooth surfaces and where face couplings are used the flanges ought to be projected sufficiently to cover the bolt heads and nuts. It is, however, not necessary for a shaft to have projections to be dangerous. Men are constantly being wound around perfectly smooth shafts. It is, of course, impossible to cover all shafting and pulleys but they should be guarded wherever men are required to work around them while they are in motion.

"One needs but to follow up accidents in any large plant to be convinced that gears are dangerous, regardless of their location. We have also learned that no gear is properly guarded unless it is completely enclosed.

"The most difficult problems in machine protection are those encountered in guarding special machines. Not to decrease production and not to hamper operation in guarding machinery are very important features which merit careful study. No guard or safety device that ultimately limits production can be considered entirely satisfactory.

I believe that there does not exist a piece of machinery which cannot be well protected if we devote to it our careful consideration, ingenuity and engineering skill.

Safeguarding Boiler Operation

"The dangers incidental to the operation of boilers have been so generally recognized that their construction and operation have been prescribed by law. Undoubtedly the best protection is a periodical inspection by competent inspectors. To prevent explosion I should consider the use of non-return valves second only to safety valves. A non-return valve is placed on each boiler in the outlet to the header, and is so constructed that it will automatically close when there is a difference of from 3 to 5 lb. between header pressure and boiler pressure. In the event of the breaking of a tube in one boiler the valve prevents the rushing of steam from the rest of the battery into the boiler and also precludes the possibility of putting a boiler on the line before it is up to or above header pressure. Next to explosions the most serious accidents are caused by the entrance of return feed water or steam into a boiler while men are within making repairs. Such accidents can best be prevented by the locking of the valves, allowing the men within the boiler to keep the key."

Motor Accidents

While explaining the various appliances for safe guarding engines Mr. Pettibone stated that statistics show that accidents from bursting flywheels yearly exceed by 30 per cent. those from boiler explosions. "A condition parallel to the overspeeding of an engine and the bursting of flywheels is possible in certain types of motors," Mr. Pettibone said. "If through some accident the shunt field current of the shunt or compound wound motor is open and the motor is not instantly disconnected from the line, the motor may attain a dangerous peripheral speed which may burst the armature. Recently the Electric Controller & Mfg. Company put on the market a balanced protected relay to protect these types of motors." The speaker stated that the problem of stopping the prime mover from a distance is more easily accomplished when it is a motor than when it is an engine. He explained various ways in which push button motor stops may be installed where automatic starters are not used.

Passing to accidents in construction work, Mr. Pettibone said: "No accident list is complete without a generous contribution from ladders. German statistics attribute 20 per cent. of all industrial accidents to falls from ladders. It is possible in many cases to replace a ladder with a stairway which workmen can ascend and descend without risk. Frequently lack of space precludes the substitution of a stairway, and a vertical ladder seems to furnish the only possible solution. To meet this condition a safety cage has been designed. The cage consists of seven parallel bars held in position by circular bands, making in effect a tube with an interior diameter of 27 in. inside of which workmen climb. The cage is particularly advantageous at blast furnaces where the presence of gas affords an added element of danger."

In explaining the various devices for safeguarding cranes Mr. Pettibone stated that probably no single type of equipment has undergone so many changes in design to comply with safety requirements as have cranes in the last five years.

The tenth annual dinner of the Traffic Club of Pittsburgh is to be held in the Fort Pitt Hotel this (Thursday) evening, preceded by a reception. The following speakers are to be heard: Charles A. Prouty, chairman Interstate Commerce Commission; E. T. Jeffrey, chairman Denver & Rio Grande Railroad and president Western Pacific Railroad; Burns D. Caldwell, president Wells, Fargo & Co. F. A. Ogden, general freight agent Jones & Laughlin Steel Company, is president of the club and will be toastmaster at the dinner.

The Bethlehem Steel Company, South Bethlehem, Pa., last week finished a steel casting weighing 260,000 lb., which will be used as a platen for a 10,000-ton forging press for the Carnegie Steel Company. This is the largest steel casting so far made in this country. The total steel poured was about 300,000 lb., but the gates and risers took about 40,000 lb.

A New Specification for Steel Rails

Adopted by the American Railway Engineering Association at Its Chicago Meeting—
The Latest Views of Railroad Experts

The most important outcome of the meeting of the American Railway Engineering Association held at Chicago March 19-21 was the adoption of a specification for steel rails which had been recommended by the association's Committee on Rail. This specification now goes to the American Railway Association, which holds its annual meeting in New York May 15. Its preparation had been referred by the latter organization, the membership of which is composed of executive officers of the railroads, to the American Railway Engineering Association, whose members are chiefly representatives of the engineering staffs of the railroad companies. The committee has been guided in part in its work by the investigations of Max H. Wickhorst, who has devoted himself exclusively to such research in the past two years. The new specification, which is printed below, embodies the more stringent requirements in the testing of rail steel which are being imposed as the result of the latest investigations of rail failures. It will be noticed, for example, that test pieces are taken from three ingots from each open hearth heat—the second, middle and last full ingot of the heat. Below are given, first the report of the Committee on Rail, and second, the proposed specification. It will be seen by the former that representatives of the rail manufacturers committee were present at the meeting held in New York last November.

Report of Rail Committee

During 1911, meetings were held at Chicago, March 20, 1911; Atlantic City, June 29, 1911; Chicago November 14, 1911; New York, November 23 and 24, 1911; New York, February 13, 1912. At the meeting held in New York, November 23 and 24, representatives of the Manufacturers' Committee were also present. In addition to the above meetings several meetings of the sub-committees were also held. Reports have been submitted during the year, as a part of the Rail Committee's work, as follows:

(A) A Study of Seventeen Good Service Rails, by Robert Trimble and W. C. Cushing, with notes by M. H. Wickhorst. These rails contained carbon within or a little above the usual limit for 85-lb. rails, namely, 0.45 to 0.55. With this carbon the phosphorus was close to 0.10 or above, the manganese was mostly within the usual limits of 0.80 to 1.10. Some of the rails were of fairly uniform composition throughout the section as indicated by the etching, but others were more or less segregated. This study did not perhaps lead to any very definite results, but indicates that under some conditions segregated rails high in phosphorus, and possibly also in carbon, may give long service, although it does not define these conditions either of track or material.

(B and C) Rail Failure Statistics for the Year Ending October 31, 1910, and Segregation and Other Rail Properties as Influenced by the Size of Ingot, by M. H. Wickhorst. Mr. Cushing made a study of the Rail Failure Statistics and below are his comments on the subject:

(1) Study of these general statistics does not furnish accurate and specific information so as to determine the value of different sections of rail, because:

- (a) The conditions of traffic are different.
- (b) The conditions of roadbed are different.
- (c) The conditions of ingot making and rolling practice are so different that the quality of the material varies widely, and, at the present time, this difference in quality of the material eliminates differences in section; nevertheless, when the time comes that the difference in quality of material will be less, the influence of the section will be more apparent, for there is no doubt that one section is stiffer and stronger than another according to the distribution of the material. Inasmuch as we are endeavoring to eliminate the differences in quality of material and bring it to a high state of perfection, we should not, in the meantime, lose sight of the desirable features of the rail section, but keep them constantly in mind, so that when we arrive at a good quality of metal we will also have a desirable rail section.

(2) A study of these general statistics tends to disclose unusual results, and were it not for their compilation we would not have much information relative to the dif-

ference between Bessemer and open-hearth steel and concerning the various alloys.

(3) The general statistics are also important, in showing a relation between broken rails and failure of head, web and base.

(4) Their tabulation discloses the difference between steel companies when the sections and chemical composition are practically the same.

A Study of Bessemer Rails

The report by Mr. Wickhorst covers an investigation made at the South Works of the Illinois Steel Company, to throw light on the relation of the size of ingots of Bessemer rail steel to the segregation of the metalloids, locations of pipes and blow holes, and the properties of the rails. This investigation showed that under the conditions of the tests, the carbon, phosphorus and sulphur collected or segregated toward the interior and upper part of the ingot and that, in a general way, such segregation increased as the size of the ingot increased. The manganese also segregated some, but to a much smaller extent, while the silicon showed little or no tendency to segregate.

The elements which segregated as described also showed a lowering in the top part of the ingot, below the average composition of the steel, and this lowering extended downward along the sides of the ingot. The "negative" segregation increased in general as the size of the ingot increased and also extended down further along the sides of the ingot. There was also a region of negative segregation in the interior and lower part of the ingot, but the lowering of the elements was not as great in this region.

This investigation also indicated that the material was distributed in the rail bar about the same, relatively, as it was in the ingot from which the rail bar had been rolled.

(D) Tests of Rail Steel Ingots and Derivative Shapes Made at Watertown Arsenal, being a review by M. H. Wickhorst of the report published by the Watertown Arsenal.

This report covers a digest and analysis of the government investigation at the Watertown Arsenal of rail steel ingots and derivative shapes as embodied in the Report of Tests of Metals, etc., made at the Watertown Arsenal for the year 1909. The work indicated that the interior cavities of an ingot cooled directly after pouring are about the same or slightly less than in a similar ingot placed in the soaking pit and then cooled. This same result was also indicated as true of blooms made from such ingots. It was shown that almost the full tensile strength and ductility of the metal of the lower part of the ingot were obtained by rolling to about one-tenth of the original cross-section, but with the metal of the upper part of the ingot it was necessary to reduce the cross-section to one-twenty-fifth or less of the original amount.

A great many etchings were made and it was shown that the structure of the cross-section as developed by etching varies, from the top to the bottom of the ingot and that each structure finds its counterpart in succeeding shapes and at about the same proportionate distance from the top end. It was also shown that the structure was considerably altered by changing the position in which the ingot was allowed to cool, as for instance allowing it to cool on its side after stripping.

Rolling Temperature and Rail Quality

(E) Influence of Rolling Temperature on the Properties of Bessemer Rails, by M. H. Wickhorst.

This report covers an investigation made at the works of the Carnegie Steel Company to determine the influence of the temperature of rolling on the properties of Bessemer rails. This work indicated that the ductility and deflection in the drop test were influenced little, if any, by the rolling temperature. The number of blows that it took to break the rails in the drop test was uninfluenced by the temperature of rolling. The yield point and tensile strength in the tension tests were influenced little, if any. The elongation in the tension test decreased some as the temperature increased. The influence of temperature showed most prominently in the tension test, in the reduction of area, which decreased as the temperature of rolling increased. The size of the grain, as shown by the microscope, increased as the temperature increased. In this report it is also pointed out that the ductility in the drop test with the head of the rail in tension more nearly indicates the ductility of the interior metal as measured in the tension test, than does the ductility in the drop test with the base of the rail in tension, which is usual in inspection work.

Each report mentioned above gives a short summary of the matter contained in it, but the main principles that seem to have been brought out by the year's work are brought out in the brief reviews above.

The general plan of research work during the year has been to direct attention to some one item which enters as a factor in the properties of the finished rail and attempt to obtain definite information concerning its influence by the experimental method of obtaining as great a range as practicable in the one item under consideration, but leaving all other conditions as near alike as obtainable in the several experiments. It is thus hoped to establish in the course of time the metallurgical principles and laws that apply to the manufacture of steel rails.

The following subjects were assigned for 1911:

(1) Recommend changes in the specifications for steel rails. Considerable work has been done during the past year in the preparation of specifications, and the specifications submitted herewith are recommended by the committee. Some paragraphs, such as Nos. 5, 6, 14 and 15, are not to be considered as final, it being thought that the committee did not have sufficient information in its possession to make these sections in the specifications mandatory. One of the sections in question, No. 14, refers to the ductility test. The requirements, in the specifications, for ductility are somewhat lower than some members of the committee think desirable, and it is hoped that sufficient information will be obtained during the coming year to enable the committee to make some revision in these respects. Paragraph No. 15, referring to deflections as a method of classifying rails, is also tentative. It is the intention when sufficient data is at hand to prescribe maximum and minimum limits for deflections under the drop test.

(2) Present recommendations on standard rail sections. The committee reports progress.

(3) Continue investigation of the breakage and failure of rails and present summary of conclusions drawn from reports received. Bulletin No. 137 contains the rail failure statistics for the year ending October 31, 1910, and the conclusions in regard to the matter are presented in that report.

(4) Report on the results obtained from the use of open-hearth and special alloy steel rails, and the chemical composition of such rails. Bulletin No. 137, referred to above, containing the report of the rail failure statistics,

also gives all the information that the committee has in regard to open-hearth and special alloy steel rails.

In regard to the remaining part of the outline of work for the year 1911, the committee reports no progress.

The committee desires to call attention to the valuable services rendered by M. H. Wickhorst, engineer of tests for the committee. Mr. Wickhorst has succeeded in winning the confidence of the manufacturers and has thereby succeeded in securing their co-operation in the work which is being done. Considerable light has been thrown upon the subject by these investigations of Mr. Wickhorst, and it is hoped that in the future considerable good will be accomplished as a result of the investigations.

Co-operation of Rail Manufacturers

The committee desires to acknowledge the very generous manner in which the various rail manufacturers have offered us the material and facilities of their mills to carry on this research work. The condition of co-operation that we are working under is very gratifying and, it would seem, must work toward the best interests of the railways, the steel mills and the general public.

The committee recommends the following lines for investigation during the coming year:

(1) Recommend changes in specifications for steel rails.

(2) Present recommendations on standard rail sections.

(3) Continue investigation of the breakage and failure of rails and present summary of conclusions drawn from reports received.

(4) Report on the results obtained from the use of open-hearth and special alloy steel rails, and the chemical composition of such rails.

(5) Present reports on the results of tests made on the various kinds of rail in conjunction with the manufacturers' committee on the revolving machine at South Chicago.

(6) Report on standard drilling for rails.

SPECIAL INVESTIGATIONS BY MR. WICKHORST.

(1) Test open-hearth steel in ingots of various sizes.

(2) Influence of height of ingot with usual cross-section—

- (a) Bessemer steel;
- (b) Open-hearth steel.

(3) Influence of temperature of rolling on high carbon open-hearth steel.

(4) Drop tests. Influence of temperature of test piece on ductility and deflection in drop test.

(5) Tests with reciprocating machine, especially to determine influence of interior segregation.

(6) Influence of titanium—

- (a) Bessemer steel;
- (b) Open-hearth steel.

(7) Influence of thickness of mold on segregation and cavities, cast in sand and in molds of varying thickness—

- (a) Bessemer steel;
- (b) Open-hearth steel.

(8) Influence of methods of cooling on the cooling beds, especially with high carbon steels; also the effects of cold straightening.

(9) Influence of the temperature of the liquid steel when poured into molds.

(10) Experiments with methods of casting ingots for improvements as regards blow holes, pipes, etc.

(11) Drop Tests, Permanent Set, Ductility, etc.

- (a) Influence of carbon.
- (b) Influence of phosphorus.
- (c) Influence of manganese.
- (d) Influence of span of supports.
- (e) Influence of moment of inertia.

The report is signed by Chas. S. Churchill, chairman; R. Montfort, vice-chairman; E. B. Ashby, J. A. Atwood, A. S. Baldwin, J. B. Berry, M. L. Byers, W. C. Cushing, F. A. Delano, P. H. Dudley, C. H. Ewing, C. W. Huntington, John D. Isaacs, Thos. H. Johnson, Howard G. Kelly, C. A. Morse, George W. Kittredge, J. T. Richards, J. P. Snow, A. W. Thompson, Robert Trimble, M. H. Wickhorst.

Specifications for Carbon Steel Rails

INSPECTION.

Access to Works.

1. Inspectors representing the purchaser shall have free entry to the works of the manufacturer at all times while the contract is being executed, and shall have all reasonable facilities afforded them by the manufacturer to satisfy them that the rails have been made in accordance with the terms of the specifications.

Place for Tests.

2. All tests and inspections shall be made at the place of manufacture, prior to shipment, and shall be so conducted as not to interfere unnecessarily with the operation of the mill.

MATERIAL.

3. The material shall be steel made by the Bessemer or Open-Hearth process provided by the contract.

CHEMICAL REQUIREMENTS.

Chemical Composition.

4. The chemical composition of the steel from which the rails are rolled, determined as prescribed in Section 7, shall be within the following limits:

Elements.	For Bessemer Process.		For Open-Hearth Process.	
	70 lb. and over, but under 85 lb.	85-100 lb. inclusive.	70 lb. and over, but under 85 lb.	85-100 lb. inclusive.
Carbon	0.40 to 0.50	0.45 to 0.55	0.53 to 0.66	0.63 to 0.76
Manganese	0.80 to 1.10	0.80 to 1.10	0.70 to 0.90	0.60 to 0.90
Silicon not to exceed	0.20	0.20	0.20	0.20
Phosphorus not to exceed	0.10	0.10	0.04	0.04

Modification of Carbon for Low Phosphorus.

5. When the material used at any mill is such that the average phosphorus content of the ingot metal used in the Bessemer process is running below 0.08 and in the Open-Hearth process is running below 0.03, and if it seems mutually desirable, the carbon may be increased at the rate of 0.035 for each 0.01 that the phosphorus content of the ingot metal used averages below 0.08 for Bessemer steel, or 0.03 for Open-Hearth steel.

Average Carbon.

6. It is desired that the percentage of carbon in an entire order of rails shall average as high as the mean percentage between the upper and lower limits specified.

Analyses.

7. In order to ascertain whether the chemical composition is in accordance with the requirements, analyses shall be furnished as follows:

(a) For Bessemer process the manufacturer shall furnish to the inspector, daily, carbon determinations for each heat before the rails are shipped, and two chemical analyses every twenty-four hours representing the average of the elements, carbon, manganese, silicon, phosphorus and sulphur contained in the steel, one for each day and night turn respectively. These analyses shall be made on drillings taken from the ladle test ingot not less than one-eighth inch beneath the surface.

(b) For Open-Hearth process, the makers shall furnish the inspectors with a chemical analysis of the elements, carbon, manganese, silicon, phosphorus and sulphur, for each heat.

(c) On request of the inspector, the manufacturer shall furnish drillings from the test ingot for check analyses.

PHYSICAL REQUIREMENTS.

Physical Qualities.

8. Tests shall be made to determine:

- (a) Ductibility or toughness as opposed to brittleness,
- (b) Soundness.

Method of Testing.

9. The physical qualities shall be determined by the drop test.

Drop Testing Machine.

10. The drop testing machine used shall be the standard of the American Railway Engineering Association.

(a) The tup shall weigh 2000 lb., and have a striking face with a radius of five inches.

(b) The anvil block shall weigh 20,000 lb., and be supported on springs.

(c) The supports for the test pieces shall be spaced 3 ft. between centers and shall be a part of, and firmly secured to the anvil. The bearing surfaces of the supports shall have a radius of 5 in.

Pieces for Drop Test.

11. Drop tests shall be made on pieces of rail not less than 4 ft. and not more than 6 ft. long. These test pieces shall be cut from the top end of the top rail of the ingot, and marked on the base or head with gage marks 1 in. apart for 3 in. each side of the center of the test piece, for measuring the ductility of the metal.

Temperature of Test Pieces.

12. The temperature of the test pieces shall be between 60 and 100 degrees Fahrenheit.

Height of Drop.

13. The test piece shall, at the option of the inspector, be placed head or base upwards on the supports, and be subjected to impact of the tup falling free from the following heights:

For 70-lb. rail.....	16 ft.
For 80, 85 and 90-lb. rail.....	17 ft.
For 100-lb. rail.....	18 ft.

Elongation or Ductility.

14. Under these impacts the rail under one or more blows shall show at least 6 per cent. elongation for 1 in., or 5 per cent. each for two consecutive inches of the 6 in. scale, marked as described in Section 11.

Permanent Set.

15. It is desired that the permanent set after one blow under the drop test shall not exceed that in the following table, and a record shall be made of this information.

Section	Rail	Weight per yard	Moment of inertia	Permanent set, measured by middle ordinate in inches in a length of 3 ft.	
				Bessemer process	O.-H. process
A.R.A.-A	100	48.94	1.65	1.45	
A.R.A.-B	100	41.30	2.05	1.80	
A.R.A.-A	90	38.70	1.90	1.65	
A.R.A.-B	90	32.30	2.20	2.00	
A.R.A.-A	80	28.80	2.85	2.45	
A.R.A.-B	80	25.00	3.15	2.85	
A.R.A.-A	70	21.05	3.50	3.10	
A.R.A.-B	70	18.60	3.85	3.50	

Test to Destruction.

16. The test pieces which do not break under the first or subsequent blows, shall be nicked and broken, to determine whether the interior metal is sound.

Bessemer Process Drop Tests.

17. One piece shall be tested from each heat of Bessemer steel.

(a) If the test piece does not break at the first blow and shows the required elongation (Section 14), all of the rails of the heat shall be accepted, provided that the test piece when nicked and broken does not show interior defect.

(b) If the piece breaks at the first blow, or does not show the required elongation (Section 14), or if the test piece shows the required elongation but when nicked and broken shows interior defect, all of the top rails from that heat shall be rejected.

(c) A second test shall then be made of a test piece selected by the inspector from the top end of any second rail of the same heat, preferably of the same ingot. If the test piece does not break at the first blow, and shows the required elongation (Section 14), all of the remainder of the rails of the heat shall be accepted, provided that the test piece when nicked and broken does not show interior defect.

(d) If the piece breaks at the first blow, or does not show the required elongation (Section 14), or if the piece shows the required elongation but when nicked and broken shows interior defect, all of the second rails from that heat shall be rejected.

(e) A third test shall then be made of a test piece selected by the inspector from the top end of any third rail of the same heat, preferably of the same ingot. If the test piece does not break at the first blow and shows the required elongation (Section 14), all of the remainder of the rails of the heat shall be accepted, provided that the test piece when nicked and broken does not show interior defect.

(f) If the piece breaks at the first blow, or does not show the required elongation (Section 14), or if the piece shows the required elongation but when nicked and broken shows interior defect, all of the remainder of the rails from that heat shall be rejected.

Open-Hearth Process Drop Tests.

18. Test pieces shall be selected from the second, middle and last full ingot of each Open-Hearth heat.

(a) If two of these test pieces do not break at the first blow and show the required elongation (Section 14), all of the rails of the heat shall be accepted, provided that these test pieces when nicked and broken do not show interior defect.

(b) If two of the test pieces break at the first blow, or do not show the required elongation, or if any of the pieces that have been tested under the drop when nicked and broken show interior defect, all of the top rails from that heat shall be rejected.

(c) Second tests shall then be made from three test pieces selected by the inspector from the top end of any second rails of the same heat, preferably of the same ingots. If two of these test pieces do not break at the first blow and show the required elongation (Section 14), all of the remainder of the rails of the heat shall be accepted, provided that the pieces that have been tested under the drop when nicked and broken do not show interior defect.

(b) If two of these test pieces break at the first blow or do not show the required elongation (Section 14), or if any of the pieces that have been tested under the drop when nicked and broken show interior defect, all of the second rails of the heat shall be rejected.

(c) Third tests shall then be made from three test pieces selected by the inspector from the top end of any third rails of the same heat, preferably of the same ingots. If two of these test pieces do not break at the first blow, and show the required elongation (Section 14), all of the remainder of the rails of the heat shall be accepted, provided that the pieces that have been tested under the drop when nicked and broken do not show interior defect.

(f) If two of these test pieces break at the first blow or do not show the required elongation (Section 14) or if any of the pieces, that have been tested under the drop when nicked and broken show interior defect, all of the remainder of the rails from that heat shall be rejected.

No. 1 Rails.

19. No. 1 classification rails shall be free from injurious defects and flaws of all kinds.

No. 2 Rails.

20. (a) Rails, which, by reason of surface imperfections, or for causes mentioned in Section 30 hereof, are not classed as No. 1 rails, will be accepted as No. 2 rails, but No. 2 rails which contain imperfections in such number or of such character as will, in the judgment of the inspector, render them unfit for recognized No. 2 uses, will not be accepted for shipment.

(b) No. 2 rails to the extent of 5 per cent. of the whole order will be received. All rails accepted as No. 2 rails shall have the ends painted white and shall have two prick punch marks on the side of the web near the heat number near the end of the rail, so placed as not to be covered by the splice bars.

*DETAILS OF MANUFACTURE.**Quality of Manufacture.*

21. The entire process of manufacture shall be in accordance with the best current state of the art.

Bled Ingots.

22. Bled ingots shall not be used.

Discard.

23. There shall be sheared from the end of the bloom, formed from the top of the ingot, sufficient metal to secure sound rails.

Lengths.

24. The standard length of rails shall be 33 ft., at a temperature of 60 deg. Fahr. Ten per cent. of the entire order will be accepted in shorter lengths varying by 1 ft. from 32 ft. to 25 ft. A variation of $\frac{1}{4}$ in. from the specified lengths will be allowed. No. 1 rails less than 33 ft. long shall be painted green on both ends.

Shrinkage.

25. The number of passes and speed of train shall be so regulated that on leaving the rolls at the final pass, the temperature of the rail will not exceed that which requires a shrinkage allowance at the hot saws, for a rail 33 ft. in length and of 100 lb. section, of $6\frac{1}{4}$ in. and $\frac{1}{8}$ in. less for each 10 lb. decrease in section.

Cooling.

26. The bars shall not be held for the purpose of reducing their temperature, nor shall any artificial means of cooling them be used after they leave the finishing pass. Rails, while on the cooling beds, shall be protected from snow and water.

Section.

27. The section of rails shall conform as accurately as possible to the template furnished by the railroad company. A variation in height of 1-64 in. less or 1-32 in. greater than the specified height, and 1-16 in. in width of flange, will be permitted; but no variation shall be allowed in the dimensions affecting the fit of the splice bars.

Weight.

28. The weight of the rails specified in the order shall be maintained as nearly as possible, after complying with the preceding Section. A variation of one-half of 1 per cent. from the calculated weight of section, as applied to an entire order, will be allowed.

Payment.

29. Rails accepted will be paid for according to actual weights.

Straightening.

30. The hot straightening shall be carefully done, so that gagging under the cold presses will be reduced to a minimum. Any rail coming to the straightening presses showing sharp kinks or greater camber than that indicated by a middle ordinate of 4 inches in 33 feet, for A. R. A. type of sections, or 5 inches for A. S. C. E. type of sections, will be at once classed as a No. 2 rail. The distance between the supports of rails in the straightening presses shall not be less than 42 inches. The supports shall have flat surfaces and be out of wind.

Drilling.

31. Circular holes for joint bolts shall be drilled to conform accurately in every respect to the drawing and dimensions furnished by the railroad company.

Finishing.

32. (a) All rails shall be smooth on the heads, straight in line and surface, and without any twists, waves or kinks. They shall be sawed square at the ends, a variation of not more than 1-32 in. being allowed; and burrs shall be carefully removed.

(b) Rails improperly drilled or straightened, or from which the burrs have not been removed, shall be rejected, but may be accepted after being properly finished.

Branding.

33. The name of the manufacturer, the weight and type of rail, and the month and year of manufacture shall be rolled in raised letters and figures on the side of the web. The number of the heat and a letter indicating the portion of the ingot from which the rail was made shall be plainly stamped on the web of each rail, where it will not be covered by the splice bars. The top rails shall be lettered "A" and the succeeding ones "B," "C," "D," etc., consecutively; but in case of a top discard of twenty or more per cent., the letter "A" will be omitted. Open-Hearth rails shall be branded or stamped "O. H." All markings of rails shall be done so effectively that the marks may be read as long as the rails are in service.

Separate Classes.

34. All classes of rails shall be kept separate from each other.

Loading.

35. All rails shall be loaded in the presence of the inspector.

The receivers of the Lucknow Iron & Steel Company have sold the personal property, consisting of crude and finished materials at the Manatawney rolling mill, which was being operated under lease from the Pine Iron Works, Pine Forge, Pa., to the Brandywine Mfg. Company, Philadelphia, Pa. The officers of the Pine Iron Works have also leased the mill property to the Brandywine Mfg. Company, which will place it in full operation as soon as repairs are completed.

The Heine Safety Boiler Company, St. Louis, has elected E. D. Meier, president; H. C. Meinholtz, first vice-president; E. C. Meier, second vice-president; T. G. Meier, treasurer; E. R. Fish, secretary.

Second Conference on Rails

A Smaller Committee Will Make Definite Recommendations

The joint committee of railroad executive officers and presidents of steel companies, appointed at the conference held at the call of Chairman Gary of the United States Steel Corporation on February 15, met in New York at the offices of the American Railway Association, March 21. The railroad representatives on this committee, all of whom were present or represented at the meeting except President Delano, are the following:

Daniel Willard, president Baltimore & Ohio Railroad.
H. U. Mudge, president Chicago, Rock Island & Pacific Railway.
W. G. Besler, vice-president and general manager Central Railroad of New Jersey.
G. L. Peck, general manager Pennsylvania Lines West of Pittsburgh.
T. E. Clarke, general superintendent Delaware, Lackawanna & Western Railroad.
Fairfax Harrison, president Chicago, Indianapolis & Louisville Railway.
B. F. Bush, president Missouri Pacific Railway.
J. Kruttschnitt, director of maintenance and operation, Union and Southern Pacific systems.
H. E. Byram, vice-president Chicago, Burlington & Quincy Railroad.
L. F. Loree, president Delaware & Hudson Company.
A. W. Sullivan, formerly general manager Missouri Pacific Railway.
Stuyvesant Fish, director Missouri, Kansas & Texas Railway.
W. C. Brown, president New York Central Lines.
F. A. Delano, president Wabash Railroad.

The steel company representatives in addition to Judge Gary, all of whom were present except President Schwab, are named below:

James A. Farrell, president United States Steel Corporation.
E. J. Buffington, president Illinois Steel Company.
E. A. S. Clarke, president Lackawanna Steel Company.
George G. Crawford, president Tennessee Coal, Iron & Railroad Company.
A. C. Dinkey, president Carnegie Steel Company.
E. C. Felton, president Pennsylvania Steel Company.
C. S. Price, president Cambria Steel Company.
C. M. Schwab, president Bethlehem Steel Company.
J. F. Welborn, president Colorado Fuel & Iron Company.
F. W. Wood, president Maryland Steel Company.

Several hours were spent in discussing the matters which had been referred to the committee and the lines on which its work might best be conducted. The remarks of some of the speakers showed the great diversity in track conditions as well as the diversity in practice in the mills, indicating how impossible it is to represent with any accuracy the status of the rail problem by general statements. It appeared, for example, that differentiation between the service of Bessemer and open-hearth rails had not been carefully observed in some statements made on behalf of the railroads. The discussion was in the best spirit and showed a disposition on both sides to recognize the mutual responsibility of the railroads and the steel manufacturers. The following statement was given out by President Willard, of the Baltimore & Ohio, chairman of the executive committee of the American Railway Association, and Judge Gary, representing the manufacturers:

"A meeting of the joint committee heretofore appointed by the railroad companies and manufacturers at the meeting held February 15 was in session during the entire day. A full and frank discussion of the questions relating to the character and wearing qualities of rails was had and the opinions of experts received and considered. The questions of mill practice in manufacturing rails and usage of the rails in tracks were discussed and it was conceded that improvements can and ought to be made by both sides. Every reasonable effort will promptly be made in this direction.

"Important facts were gathered together and much benefit will be derived as the result of the meeting. Before adjournment a sub-committee of six was appointed consisting of three representatives of the railroad companies and three representatives of the manufacturers to consider the whole subject matter and report their conclusions and recommendations at a future meeting of the general committee to be called by the chairman."

The committee of six referred to above was not actually appointed at the meeting, but Mr. Willard was empowered to name three members on behalf of the railroads and Judge Gary to designate three representatives of the rail manufacturers.

The Lake Ore Rebate Cases

The suits brought by the Federal Government against several railroads and dock companies and individuals, growing out of rebating ore-handling charges at Lake Erie ports, were disposed of by Judge Killits in the Federal Court in Cleveland March 23. Following the recommendation of the Interstate Commerce Commission, fines amounting to \$123,000 were imposed on several railroads and dock companies and indictments against three individuals—R. L. Ireland and Dan R. Hanna of M. A. Hanna & Co., and D. T. McCabe, fourth vice-president of the Pennsylvania Railroad—were quashed. Fines were imposed as follows: Pennsylvania Railroad, \$30,000; Ohio & Western Pennsylvania Railroad, \$10,000; Lake Shore & Michigan Southern Railroad, \$20,000; Union Dock Company, \$7,000; Ashtabula Dock Company, \$6,000; Pittsburgh & Conneaut Dock Company, \$17,000; Pessemer & Lake Erie Railroad, \$30,000; New York, Chicago & St. Louis Railroad, \$3,000.

On February 1 last the cases were brought before Judge Killits and pleas of "not guilty" were filed, counsel reserving the right to withdraw the pleas within two weeks in case the defendants desired to file demurrers. At the request of the Interstate Commerce Commission, which was then considering the relations between the railroads and dock companies, an extension of time was granted.

When the cases came up for final disposal a lengthy conference was held between the counsel for the Government and defendants, during which an agreement was apparently reached. Pleas of *nolle contendere* were made by defendant companies and the court ordered pleas of guilty to be entered. The court granted the request of the defendant companies that some of the counts be quashed and pleas of guilty were entered in the case of the other counts against the companies. After the pleas had been entered United States District Attorney U. G. Denman read a communication from the Interstate Commerce Commission recommending that the court agree to fine the corporations \$20,000 each on their entering pleas of guilty and to dismiss the indictments against individuals. A communication read from Attorney General Wickersham advised that the recommendation be followed. The cases against the Angeline Dock Company and the Mahoning & Shenango Dock Company were dismissed because those companies were dissolved before the indictments were returned.

The indictments were returned April 26, 1911, against 18 corporations and three individuals on the charge that the rebates complained of were a conspiracy in violation of the Elkins law. The cases were brought to insure the enforcement of published ore shipping rates.

The rebating charges grew out of conditions in ore handling that existed prior to 1909, when, it was understood, the rebating practice was discontinued. The ore docks are owned by railroads and are operated by independent companies. The Government claimed that railroads paid excessive rates to the dock companies for unloading ore and that the latter rebated a portion of this money to the ore consumers.

Owing to the introduction of improvements in ore-handling machinery, the cost of handling ore had been materially reduced, and it was the contention of the railroads and dock companies that the consumer got the benefit of the reduced cost of handling in the way of rebates. It was denied that any discrimination was shown in these rebates and that the violation of the law was only technical. Rebates were finally discontinued and the rates were reduced.

As indicating that the amount of freight being handled by the railroads is increasing steadily, it is noted that on Saturday, March 23, the Philadelphia Division of the Pennsylvania Railroad handled 8425 cars of freight, breaking all records for the movement of freight between Philadelphia and Harrisburg.

The Thomas Steel Company, Niles, Ohio, has reduced its capital stock from \$500,000 to \$10,000. This is one of the companies that was absorbed by the Brier Hill Steel Company and in the future will maintain only a nominal existence.

Fundamentals in Efficient Manufacturing

Observations Made at Meeting of the Efficiency Society in New York Regarding Administration, Production and Cost Keeping of the Industrial Establishment

Among the papers presented before the Efficiency Society, which organized and held a two-day meeting in New York City on March 18 and 19, were three dealing respectively with the administrative, the production and the record and cost departments of industrial establishments. These papers were read by Melville W. Mix, president of the Dodge Mfg. Company, Mishawaka, Ind.; John Calder, manager of the Remington Typewriter Works, Iliou, N. Y., and Dr. Schuyler S. Wheeler, president of the Crocker-Wheeler Company, Ampere, N. J. Some of the main points brought out are briefly enumerated in the following notes:

Mr. Mix discussed the efficiency of the administration. This, he said, reflects the efficiency of the dominating executive and the departments he represents. A greater percentage of inefficiency exists in the administrative heads of business, he continued, than in the factory and in the shop. The deficiencies of the administrative department he analyzed as follows:

1. Failure of a business to secure adequate return. Fifteen per cent. after deduction of fixed charges and maintenance should be expected. A grave defect is that a business is operated for the benefit of the speculator rather than for the stockholder.

2. Failure to build business for a permanent future. Some well-known trademarks, *e. g.*, Steinway, Tiffany, Sapolio, Castoria, are in the nature of an investment rather than an operating expense in publicity promotion. Failure to maintain proper standards is a breach of trust and is a far greater menace to capital than a slight lowering of the dividend rate.

3. Failure to appreciate duty toward the public. It is a duty to place goods in the hands of the public at a reasonable price. Inefficiency of this sort leads to a demand for government ownership. The public should not stand for a higher price than that which will return a reasonable return and a reasonable wage.

These deficiencies are due to the lack of knowledge, intelligence, training, ability, judgment, character. The majority of executives are satisfied with ordinary results rather than eager to push ahead to unusual success. They content themselves with what others have done rather than to push ahead with some new idea, some new line of activity.

Mr. Calder discussed production. Tracing the history of the division of labor from the days of Adam Smith, 136 years ago, labor has shown little disposition to improve the trade. Little has been done in time study except in a few simple elementary instances. There are a variety of systems directed, as a whole, to obtain the greatest productive capacity. They are classed as divisional and departmental. The military or divisional system has its difficulty in human limitations as the plant grows. As to the functional system, in actual practice, shop management is an art and not a practice. Fred W. Taylor claims that the science of the industry should be developed, but the science applicable to cutting metals is not necessarily applicable to other lines, is not universal. The departmental system splits up the shop into units of suitable size, holding the heads of the departments strictly accountable for the best development. True scientific management relates to facts and not to theories.

The best type of shop system is evolved through the shop itself; a busy and prosperous administration should always be on the lookout for better methods. The best method is that which will co-ordinate the efforts of all and draw out and suitably reward all concerned, even the employers. Methods:

- a. Have a well considered system for all.
- b. See that a perfect understanding of it exists.
- c. Make connections clear through a chart.
- d. Have as little system and few forms as possible.
- e. Do not treat system as a teacher.

- f. Do not fail to note cost of system.

- g. Be always on the lookout for improvement.

Dr. Wheeler discussed the indispensability of accurate and reliable knowledge of costs in a competitive business. Some of the points brought out in his paper were the following: Material must be represented by the actual value on the books; material and labor should be kept on a double entry system. If stage money, say, were supplied to foremen for their use in buying material from the store-rooms and in buying labor this would be an exact cost system. Miscellaneous or general expenses must be included and distributed to productive work. The total general expense for the month, say, should be found, and a distribution should be made, part on labor and part on material. The division should cover manufacturing and general expenses. One department is sometimes a greater expense than others. Some involve little floor space and small tools; others large floor space and large, expensive tools. The cost of selling should not be included in the value of material.

A collection of memoranda of costs, each of which is estimated cost, or all that the foreman remembers to put on sheets, is the usual procedure, whether kept on tags or cards or in books or on sheets in the office. This is an attempt at single entry bookkeeping, an unstable method. There is far more danger in failure to keep material values straight than in failure to keep cash straight.

Correction.—On page 794 in the article entitled "Wrought Iron, Steel and Corrosion" the expression "0.017 per cent manganese" is a stenographic error, the correct figure being 0.17 per cent.

The American Iron & Steel Institute plans to hold its special meeting for the consideration of papers relating to the scientific, statistical, welfare and other aspects of the iron and steel industries on Friday, May 17, in New York. It is intended to hold a banquet at the Waldorf-Astoria Hotel on the evening of that day and to devote Saturday to visiting conspicuous examples in the Metropolitan territory of the application of iron and steel products, such as the terminal work now going on for the New York Central Railroad and the numerous tunnel propositions in New York. The annual meeting of the institute will be held May 6.

No less than 31 motor-driven vehicles are wanted by the Fire Department of New York City. The advertisement covers 26 combination chemical and hose wagons, three wagons of the high-pressure type and two motor-driven hose wagons. They are intended particularly for the fire houses in the suburban districts. Each combination chemical and hose wagon carries a 70-gal. chemical tank and is required to have a speed of 35 miles an hour and to climb difficult hills.

A decree to make the Aluminum Company of America square with the Sherman anti-trust law is apparently being amicably arranged for by agreement between the United States Attorney General and the counsel for the company. It is the understanding that a suit will be filed against the company at Pittsburgh, and that the parties to it will make their appearance in court and the agreed decree will then be entered.

The Fried. Krupp Aktiengesellschaft, Essen, Germany, is stated to have invested \$1,000,000 in the Dunderland Iron Ore Company, which was founded in 1892 to work large iron ore deposits in Norway. This company has a very large deposit of iron ore, but the metallic contents are so low as to compel concentration and so large an amount of money was expended in providing the necessary equipment that the company became financially crippled.

A New Mill for Rolling Hard Steel Bars

A Departure in Handling 30-Ft. Rails Which Are Slit Into the Head, Web and Flange Portions in One Operation—Shipping and Other Arrangements

The Laclede Steel Company, St. Louis, is completing a mill for the rolling of hard steel bars of standard sizes and shapes for concrete reinforcing, for implement purposes and for bedstead manufacture. Special shapes also will be rolled. The mill, in its equipment and layout, has been designed in several particulars outside of previous practice. With the successful operation of the arrangement planned, a capacity estimated at 4000 tons per month is anticipated. The engineering work and the building of the mill equipment was entirely in the hands of the United Engineering & Foundry Company, Pittsburgh, worked up from elementary designs by the Laclede Steel Company. The mill is located at Madison, Ill., where the markets of the Southwest and St. Louis territory may be reached with a decided advantage over the Chicago & Moline; where the Missouri valley common points may be reached on an equal basis with Moline and where a majority of northern Illinois consumers are as accessible as from the other principal Western hard-steel bar mills.

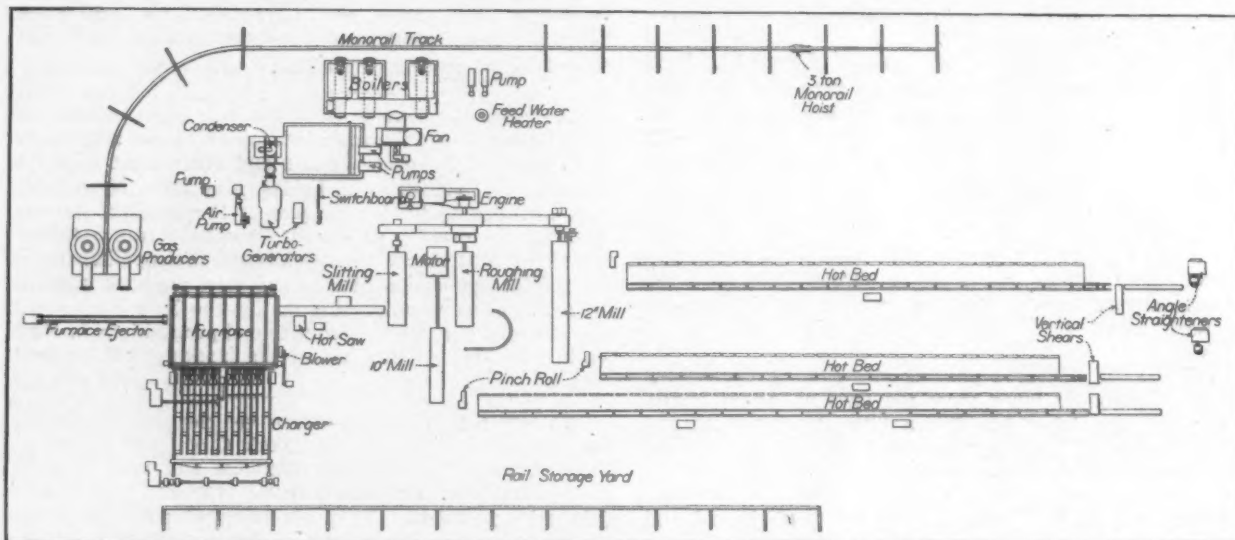
An important departure has been made in designing the mill to handle rails in 30 ft. lengths. This has necessitated an unusually large furnace and a hot bed about 200 ft. long, which even then will not be of sufficient length to accommodate the smallest sections that may be rolled. The mill is also arranged with a 16-in. two-high slitting set, in which it is the intention to accomplish the slitting of the rail into head, web and flange portions in one operation. Owing to the considerable variation existing in rerolling rails as raw material, and the fact that in

high and variable speed requirements of the web rolling, a 10-in. mill of four two-high stands, separately driven from a 350-hp. variable speed motor. A plan of the general arrangement is here shown.

The main mill building is 600 ft. long and 69 ft. wide, with wings for the engine room, boiler house and machine shop. It is a steel frame structure, inclosed with corrugated sheeting, the lower half of the walls at the finishing end being fitted with vertical sliding doors. The raw material yard for the storage of incoming old rails parallels this building on one side and is served by a 5-ton Northern Engineering Works crane having a span of 65 ft.

As indicated in the layout, the heating furnace is located at the extreme end of the building. The rail feed bed for the furnace consists of rail section skids extending with a slight incline out into the storage yard under the crane. This feed table is equipped with a rail pusher of special design, which is arranged to travel the length of the feed table. It is operated by means of a motor and rope drive. The revolving rails are placed on this feed table from the storage yard crane, and the operator of the pusher, stationed inside of the mill building near the furnace, feeds the rails into the furnace.

The furnace is of standard construction with a Slick roof, and is unique in being wide enough to admit of heating a 30-ft. rail. It is gas fired from two Morgan gas producers with George automatic feeds. The producers are located in front of the mill building. The furnace is also equipped with an electrically controlled rope-driven



General Plan of New Mill of Laclede Steel Company at Madison, Ill.

hard-steel bar requirements orders are usually considerably split up, it has been the practice to slit the rails in no less than two operations. It is planned to do the slitting in a single pass and make the movement of the piece continuous into a two-high 16-in. roughing set.

In contrast with other arrangements where the bar is rolled out in one stand through several passes or in which a 14-in. mill capable of giving some of the heavy roughing passes is included, the Laclede layout provides for the heavy roughing passes at slow speed in the slitter and roughing stands, complete. For the finishing passes on the head and flange sections a 12-in. mill is used as conforming more exactly with the range of rolling required on these sections and permitting operation at a rolling speed more nearly proportionate to that work. The 12-in. mill consists of three three-high stands for the heads and two three-high and one two-high finishing stand for the flanges. In addition, the arrangement provides for the

ejector, by means of which the heated rails are pushed out of the furnace.

In the path of the rail, as it is being ejected from the furnace and preceding the approach table for the slitting set, is a stand of live feed rolls, motor driven, and also a hot-metal saw for such cutting off of the rails as may be required. The passing of the rail through the slitting set and the movement of the head, web and flange into the 16-in. roughing set is practically continuous over a motor-driven table. From the roughing set the head and flange move in a straight line into the 12-in. mill and are worked from the center stands in opposite directions out to each end, each piece passing through three sets and being delivered through the motor-driven feed rolls to the hot beds. The web section is delivered from the roughing set by means of a repeater to the 10-in. mill, where in the four stands a very flexible schedule of passes is possible. The higher speeds at which the 10-in. mill operates preserve

a balance in the mill rolling, and the webs can be finished in parallel with the heads and flanges.

The main drive for this mill is a 1200 hp. 84 x 48-in. Southwark Corliss engine. The engine runs at an average speed of 108 r.p.m. and is direct connected to the 16-in. roughing mill. The slitting set is driven by a rope drive from the main shaft with a main shaft sheave wheel 9 ft. 6 in. in diameter, driving to a sheave 14 ft. in diameter and giving to the slitter a speed of practically 90 r.p.m. The main shaft sheave for the 12-in. mill rope drive is 14 ft. diameter and drives to a 7 ft. sheave, giving to the 12-in. mill a speed of practically 200 r.p.m. While the speed of the slitting, roughing and 12-in. mills ordinarily remains within narrow limits, in the above fixed ratio, the main engine has a maximum speed of 125 r.p.m. as against 108, and is capable of considerable regulation.

The 10-in. mill is independently driven from a 350-hp. variable speed motor operating at an average speed of 350 r.p.m.

The hot bed upon which pieces from the 10-in. mill are delivered is 200 ft. long as compared with about 155 ft., the length of the hot beds for the head and flange pieces from the 12-in. mill. This greater length provides in part for rolling out 30-ft. rail webs into the smallest sections. A loading stub track which enters the mill from the finishing end runs nearly to the end of this hot bed. Pieces can thus be run directly on the flat cars on this stub as an extension of the hot beds if necessary. A vertical shear of United Engineering & Foundry Company's design is placed at the end of each hot bed, and a scrap shear, which is also used for reshearing purposes, is also conveniently located. The entire mill building is traversed by a 5-ton Northern Engineering Works crane.

Steam for the main drive and auxiliary purposes about the mill is generated in three 350 hp. Heine boilers equipped with Illinois stokers built by the Duncan Foundry & Machine Works, Alton, Ill., and a Northern Engineering Works overhead monorail coal and ash handling grab bucket trolley. This overhead monorail system also supplies the coal to the Morgan gas producers. Current for driving the 10-in. mill motor is generated in a Curtis-General Electric 500-kw. mixed flow turbo-generator set, operating on 16 or 16½ lb. of steam. Ordinarily this turbine is run condensing on the exhaust steam from the main source, that is, the Corliss engine. The air pump and condenser for this set are of the Weiss type. For auxiliary purposes a 75 kw. Curtis turbo-generator set is installed which operates non-condensing on steam at 150 lb. Service water for the mill is obtained from wells by means of two deep well motor-driven turbine pumps with a capacity of 1000 gal. per minute, working from a depth of about 85 ft. and delivering to the line, where the water is in turn delivered around the plant by two similar 1000 gal. per minute motor-driven turbine pumps.

In the wing adjoining the main building the machine shop has been installed, which includes in its equipment a Cleveland Planer Works open-side planer, two Prentiss engine lathes, two Rockford shapers, an American radial drill, a Prentice Bros. upright drill and an individual motor-driven double-end roll turning lathe.

Hydraulic Riveting of Boilers*

BY H. J. HARTLEY

The following remarks were inspired by the leading topical question, at the meeting of the association, held in Boston, Mass., in 1911, which asked: "(a) Should the hydraulic pressure applied to drive a rivet 1½ in. diameter (0.994 sq. in.) ever equal 100 tons; or, on a 1 in. rivet, 80 tons? (b) On a ¾ in. rivet, 75 tons? (c) On a ¾ in. rivet, 70 tons? (d) Would it make better and tighter work to apply 25 per cent. less pressure three times to each rivet at intervals and during such intervals drive a number of rivets to be treated the same?"

In reading over the comments upon that important subject as published in the proceedings I was impressed with the idea that the question had not been fully discussed nor appreciated as being the most vital unit in the whole structure of a boiler.

*From a paper presented before the American Boiler Manufacturers' Association, New Orleans, March 12.

Rivets Should Completely Fill Holes

Considerable diversity of opinion seems to exist upon the pressure per square inch of rivet section required for all classes of boiler work. At the present time the importance of having rivets to completely fill the holes is more fully realized and insisted upon being so in all classes of work than was the case 20 years ago.

Under the old system of hand riveting, with the holes much too large for the size of rivets to be driven therein, doubtless much imperfect work was made, which was, and still is, a fruitful source of disaster, as rivets with loose-fitting bodies or shanks are not only imperfect in themselves, but they allow undue weakness in the plates owing to unequal and incomplete bearing surfaces. Hence the strongest joint has been found by experiment to be that in which the area of the rivet body exceeds the net sectional area of the plate; the increased friction on the bearing surfaces and grip of the rivet heads on the plates more than compensating for the reduced plate area.

When riveted joints are being formed the tendency is for the rivet to be upset on the ends where the final head is being formed, the friction in the rivet-hole resisting its flow to some extent. The tendency will also be for the rivet to fill the hole completely at the one (blank) end and less perfectly at the end next to the original head.

It is, therefore, conducive to tight work to have a fillet under the head of the rivet, which will, wedgelike, jam into the slightly countersunk hole, thus insuring, at least without the necessity of calking, a water-tight rivet, provided the plates composing the joint have been properly fitted and the rivet holes made fair and of proper size for the rivets to be used. The allowance on increased sizes of rivet holes for heat expansion over the sizes of the rivets to be driven in first-class high-pressure boiler work should not exceed the following fractional numerals advancing by ⅙ in. and so on proportionately:

For a ¾-in. diameter, plus 1-32 in.
For a ¾-in. diameter, plus 3-64 in.
For a 1-in. diameter, plus 3-64 in.
For a 1¼-in. diameter, plus 3-64 in.
For a 1½-in. diameter, plus 1-16 in.
For a 1¾-in. diameter, plus 1-16 in.
For a 2-in. diameter, plus 1-16 in.

All rivets should be heated to a medium cherry red at the head, and, if possible, to a dark cherry red at the points.

Pressures Required for Driving Rivets

In regard to the pressures required for driving rivets cold for tank and stack work, as frequently required, I would recall some experiments made by Wm. Sellers & Co. between the compression platforms of their Emery testing machine. [The results of these tests were given.]

About the same time a series of experiments for determining the test pressures for driving rivets in high-pressure steam boilers was also made at the Baldwin Locomotive Works by Mr. Vauclain. [The results of these tests were also given.]

The conclusions drawn from these, when converted into pressure per square inch of rivet section, would be in even pounds approximately as follows:

Diameter of rivets.	Pressure per sq. in. in pounds.
¾ in.	163,000
¾ in.	149,000
¾ in.	166,200
1 in.	168,000
1¼ in.	151,200
1½ in.	163,000
Average	160,000

It will be noticed that these figures are in a very convenient shape for practical use.

The writer has been working under the foregoing described conditions with the same riveting plant for about 20 years, doing all classes of steam boiler work varying in thickness of plate from ¾ in. to 1¼ in. and in rivets from ¾ in. to 1½ in. in diameter with perfect success.

A Peculiarity of Hydraulic Riveting

There exists a condition, however, connected with hydraulic riveting that is especially favorable to rivet compression and the making of tight work, which is generally

not known or realized, and is due to an increased pressure at the terminal stroke of the ram over the initial stroke, amounting by experiment to be, conditionally, as high as 60 per cent. In other words, a static pressure of 1200 lb. per sq. in. in an accumulator has shown on the gauge at the end of the stroke a momentary impact of 2000 lb. per sq. in. It will be understood that this increased terminal pressure is due to the surge of the accumulator, on its sudden arrest, at the end of the stroke, and at the time when the rivet has become cooled from contact with the water-cooled dies and plates.

Too much value cannot be given to this terminal pressure as a climax to perfection in hydraulic riveting; the effect being about the same as a second pressure on the rivet, after partially cooling, would be. This advantage is ever there and costs nothing to obtain, being unlike the extra labor required on hand and pneumatic riveting to accomplish the same object—tightness—by having to partly drive a rivet and shift, in order to allow it to cool, to the next; partly drive it and then shift back to the first, finish it, then go again to the last left unfinished, and so on throughout.

In order, however, to obtain the full value of the terminal pressure, it is necessary for the operator to exercise some skill in admitting the initial pressure to the ram. This is done by opening the valve slowly and sufficiently until the hot rivet has been well upset into the hole, after which the full pressure should be applied, which will have the effect of accelerating the descending momentum of the accumulator, thereby causing a suddenly increased pressure on the rivet at the moment of its impact and the rebound, due to cushioning on account of more or less air in the water. This is more apparent with accumulators having small areas of pistons.

Iron Ore Find in Pennsylvania

The Announcement Excites Skepticism

The daily papers last week published a sensational article regarding "the world's greatest one body" and a "mother lode of red hematite," said to have been discovered in Fulton County, Pa., by J. N. Crossland, mining engineer, New Florence, Pa. He estimates the deposit as containing more than 1,000,000,000 tons of red hematite, brown hematite and carbonate of iron. It is located in Ayr Township, in three spurs of the Blue Ridge Mountains, known as Meadow Ground Mountains, Lowry's Knob and Dickie Mountain. From a long description credited to Mr. Crossland we quote the following:

"When I came to Meadow Ground Mountain I saw at once that the geologic formation was what we call a freak and that the rocks and formations had no place in the geological formations of Fulton County. What I had observed led me to believe that there might be some mineral wealth connected with it. I know that for nearly a century iron ore had been picked up in this section, but the general impression was that it was simply float ore coming from beds of little or no importance, and no attention was given to it, but upon careful investigation I saw that nearly every lump shows the action of the fire by the iron grain running through it, which is rarely found in bog ores. Then the igneous condition of the rocks proved almost conclusively that these ores had been pushed up by volcanic action and hence cannot be a local deposit.

"This led to further investigation and the core drill was brought into service and Meadow Mound Mountain was first investigated. At a depth of 103 ft. the drill struck a vein of red hematite ore, which was found to be 38 ft. thick.

"It is not a disseminated body, but an immense mass of iron ore with the dross burned out—hundreds of millions of tons not excelled by any ore mined in the United States to-day in high percentage of metallic iron and in purity a true Bessemer ore."

The statement is published that more than 50 assays have been made from the samples taken from as many different places by eminent chemists, including the chemist of the University of Pittsburgh, which show an average content of metallic iron ranging from 57 to 65 per cent.

The announcement of this ore find excites skepticism among geologists generally, and particularly among those

who have long been interested in Pennsylvania mining developments.

Andrew S. McCreath, of Harrisburg, Pa., member of the Pennsylvania State Geological Survey for more than 30 years, says:

"While I have no information except from newspapers, I doubt whether such a large body of ore as described exists in Pennsylvania. And I also fail to see how it could have remained undiscovered so long. I think the statements about the deposits are extravagant—extravagant in the extreme. I visited that region a number of times, and in 1880, when the second geological survey was made, we discovered little deposits of ore, some of which had been operated for years for local charcoal furnaces, but never any evidence of the very large deposit reported. We covered the whole county carefully, and the ore we found was only a fair quality of hematite, the best of it showing 46 per cent of iron."

John Birkinbine, Philadelphia, who has long been an authority on iron ore, makes the following criticism of the statements which have been given out regarding this remarkable deposit:

"The existence of ore in Fulton County is recorded in the State geological reports, and a small charcoal blast furnace was operated in the vicinity for about 25 years prior to 1847. But the data given in the State reports do not encourage an expectation of the existence of the 'world's greatest ore body.' The reports mention that the ore for the old charcoal blast furnace was mined in Ayr Township, Fulton County, to the amount of from 1200 to 2000 tons annually. The ore is mentioned as a compact brown hematite, and belongs to the upper part of the Trenton or Chazy limestones, and the analysis of a sample made by Mr. McCreath of Harrisburg is recorded as follows: Iron, 46.1 per cent.; sulphur, 0.115 per cent.; phosphorus, 0.083 per cent.; siliceous matter, 21.5 per cent.

"The 'mother lode of red hematite' referred to is, I am sure, a myth to most geologists and mining engineers, and explorations sufficient to determine 'billions of tons of high grade ore' available could not be carried on without the knowledge of such explorations becoming public property, even in the mountains of the only county of Pennsylvania which has no railroad within its borders; nor could the investigations of geologists or engineers sufficient to warrant the ultra-optimistic statements be made without the facts leaking out, if the desire was to hide these.

"I would be personally gratified and the iron and steel industry of the state benefited, if the claims made were even partially verified, for a deposit of one-tenth the quantity named, of good ore (not necessarily the 'world's best'), is well worthy of exploitation and of providing transportation facilities.

"The caption of the New York Sun's statement is 'world's best ore body,' which, fairly interpreted, means that this new find excels in quality the ore from the Lake Superior region, the Adirondack region, Wyoming, New Mexico, from Cuba, Sweden, etc. This is followed by the statement that there 'are billions of tons of high grade ore.' In 60 years the Lake Superior region has produced about half a billion tons of iron ore, and notwithstanding the extensive development there and the exploration by drill holes I estimated for the Finance Committee of the United States Senate in 1909 that the apparent reserves exceeded 1,600,000,000 tons, and the highest estimate of which I have knowledge, and which includes ore requiring concentration and other ore not of high grade, approximates 4,000,000,000 tons. The statement in the text refers to more than 250,000,000 tons of red hematite, also brown hematite and carbonate ores, and yet the reputed discoverer is quoted as saying, 'it is not a disseminated body, but an immense mass of iron ore.'"

A letter from this office to Mr. Crossland, requesting further information regarding his discovery, has elicited a reply from Hayden, Evans & Hayden, Greensburg, Pa., which states: "Mr. Crossland directs us to say that it is absolutely impossible for him to comply with your request, a fact which he deeply regrets. All of Mr. Crossland's time is taken up for the purpose of making proofs of the discovery of the ore. We wish to suggest that you, if possible, send a representative to the ground. All arrangements to examine the property will be gladly made through this office for you."

New Tools and Appliances

This is essentially a news department for which information is invited.

Pipe Wrench.—In addition to the four sizes of pipe wrench which were illustrated in *The Iron Age*, December 28, 1911, the Gealy Wrench & Mfg. Company, Grove City, Pa., has recently added another size to its line. This new wrench was designed especially for use with 2-in. pipe and has a capacity for pipe ranging from 1 to 4 in. in diameter. The over-all length of the new size is 30 in. and its weight is 10 lb. The addition of this wrench enables pipes from $\frac{1}{2}$ to 16 in. in diameter to be handled.

Insulating Tape.—The Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa., has recently placed on the market a bias cut treated cloth tape which can be used as a continuous tape or can be divided into 4-ft. lengths by tearing. A specially advantageous feature of the tape is the absence of any sewed seams, which interfere with the production of a neat piece of work. It is said to possess good tensile strength throughout its entire length and to have the same dielectric strength as the full width treated cloth. Another advantage of the absence of sewed seams is the elimination of uneven spaces caused by the running of the insulating liquid which collects in the seams during the process of treating.

Internal Grinder.—For grinding short holes in large numbers of duplicate parts the Heald Machine Company, Worcester, Mass., has recently brought out a simple and inexpensive machine which is recommended for work up to about 2 in. in length and is adapted for grinding such parts as transmission gears, bevel gears and pinions, bushings, milling cutters, rings, etc. As compared with the other machines built by this company, the principal change is that it is operated by hand instead of by automatic power feed, the table movement being controlled by a large pilot wheel, while positive stops are provided to govern the travel in either direction, thus enabling the operator to grind up to a shoulder or any other given point without over-running. On account of the shortness of the work it is pointed out that the average operator can turn out more work with this machine than was possible with the automatic one, and the quality is not affected. The weight of the table and ratio of gearing is such that a smooth, uniform motion is obtained. After a hole has been ground the wheel can be backed away and a micrometer inserted, after which the wheel can be returned to the grinding position. Another class of work which this machine is capable of handling is the grinding of holes which are recessed in the middle. The grinding spindle is rigidly supported on the main table and can be swiveled to 45 deg. on either side of the center line.

Upright Drill with Reciprocating Spindle.—W. J. Riordan & Co., Orange, N. J., have recently placed on the market an interesting type of drilling machine which can be used for key seating and similar operations in addition to drilling. The machine is so constructed that the drill spindle can be given a reciprocating movement as well as the rotary motion, this movement being obtained from a horizontal shaft at the top of the machine. This shaft is connected to the spindle quill by a slotted crank and connecting rod. The back gears for the rotary drive are placed in the neutral position and the spindle quill is disengaged from the regular feed mechanism to permit the vertical movement when the machine is operated in this way. The stroke of the spindle can be varied within certain limits by changing the position of the crankpin with relation to the center of the crank, and the machine can be quickly changed back to a drill by simply disconnecting the rod and disengaging a clutch which connects the crank disk with the horizontal driving shaft. The crankshaft is driven from the main driving shaft by spur gearing, and the clutch is controlled by a vertical lever in an easily accessible location. Aside from the reciprocating motion this machine is similar in construction to the ordinary upright drill. The table, however, differs from the regular type, as it can be tilted around a horizontal axis to accommodate angular work.

Horizontal Miller.—In addition to the line of horizontal milling machines built by the Newton Machine Tool Works, Inc., Twenty-fourth and Vine streets, Philadelphia, Pa., a planer type is also being built. The spindle is driven

by a large worm gear located at one side, the driving worm being mounted on a vertical shaft which is connected with the driving motor through gearing. The cutter arbor is driven by a broad face key and the arbor is held in place by a through retaining bolt, which is the builder's standard construction. A cross hand adjustment is provided for setting the cutters laterally and the outer end of the cutter bar is supported by a bearing having bushings with taper external bearings and adjusting nuts to compensate for wear. The cutter can be removed from the arbor without taking out the outboard bearing on account of the length of the cross rail, which is counterweighted and can be raised or lowered by power. This rail is maintained in alignment by a single bearing on the upright. The work table has an angular rack and spiral gear drive with nine changes of geared feed ranging from $\frac{1}{2}$ to 8 in. per minute. All of these feeds are available in both directions, and the work table also has a fast power traverse. The minimum distance from the center of the spindle to the top of the work table is 5 in. and the maximum distance is 31 in. The work table is 36 in. wide and work 12 ft. long can be milled.

Centering Tool.—Robert H. Fay, Chicopee Falls, Mass., is manufacturing a centering tool for use on a lathe or hand screw machine, the advantage being that the time in centering the work held in a chuck by the usual method is eliminated. When the drill becomes clogged the tool turns on the center, but ordinarily while the drill is cutting freely it remains stationary. The body of the tool is composed of two sections; one adjustable to the other, and for convenience one is threaded into the other. The forward end which carries the center drill has a hole extending the entire length and the rear one is beveled to 60 deg. The other section, which is in the form of a ring, is also beveled on the inside. When the two sections are united to within $\frac{1}{32}$ in. they form a 60-deg. angle from the small bevel to the large one, and when placed on a 60-deg. center both bearings are in contact with it. By varying the distance between the two parts the angle can be changed to more or less than 60 deg., thus permitting it to be used on centers of other angles through a reasonable degree of variation. The sections can be locked by a small screw at any point. The tool centers the work without means of steadying and locates the dead center of a whirling piece quickly.

The Simplex Hack Saw Blade.—The Simplex Tool & Supply Company, 125 Purchase street, Boston, Mass., has recently developed a line of high speed hack saw blades. These are said to be the first of their kind made from tungsten steel, and it is claimed that for both hand and power use they can be worked much more rapidly without loss of temper than the ordinary blades. It is emphasized that while the percentage of tungsten in the blades is not as high as that commonly employed for tools such as twist drills, milling cutters, etc., the blades contain enough to resist the heat generated by friction in the sawing process, thus preventing the temper of the blade from being drawn and the blade prematurely dulled. In a recent test of a blade 14 in. long, $\frac{3}{4}$ in. high and 0.05 in. thick, with 10 teeth to the inch, six disks were cut from a piece of 6-in. round machinery steel by a Racine high speed metal cutting machine at the average time of 26 min. per disk. During this test the machine was driven by an electric motor at 125 r.p.m. At the conclusion of the test the blade, while partially dulled, was nevertheless in fair condition. An ordinary blade was then tested on the same material with the machine running at 90 r.p.m.; this blade cut one disk in 56 min. and was too dull for further use. Six different makes of blades were also tested, and it is stated that the best record made was less than 25 per cent. of the output of the Simplex blade.

Adjustable Threader.—The Scott-Rose Company, Marquette Building, Chicago, Ill., has recently brought out an adjustable threader covering a range of sizes from $\frac{3}{16}$ to $\frac{3}{4}$ in. The device consists of two parallel jaws, adjustable with reference to the distance between them into which hardened steel removable die blocks are fitted. The distance between the jaws is varied slightly by a calibrated wheel ratchet operating through a cam. The threader is furnished with dies for cutting U. S. standard threads unless otherwise specified and is 15 in. long and 3 in. wide and weighs $\frac{3}{4}$ lb.

The Machinery Markets

Conditions in the machinery trade have undergone little change in the last week although a tendency toward greater activity is noted in some cities. Most notable is the large number of inquiries, most of which are ordinary in character but so numerous as to insure good business sooner or later. A good basis exists for trade when the present hesitancy comes to an end. Large industrial companies have been the best buyers in New York where, nevertheless, conditions have been quiet. In New England there has been a substantial improvement and an especially good call for grinding machines. Philadelphia dealers are doing best in special equipment and find business in standard tools irregular. A better demand has developed in Detroit largely due to replacements in the automobile plants and there has been a call for pumping equipment from municipalities. A fair volume of small orders has been placed in Cleveland, where the dealers are figuring on a list for the Big Four Railroad and where inquiries have increased. The export trade is particularly good in Cincinnati and there has been a demand for second-hand power machinery. Trade has run into good figures in St. Louis, with individual orders small. The South has suffered from bad weather, but betterment is expected soon. Despite unfavorable weather and Mexican troubles general business is satisfactory in Texas. There has been an increased number of inquiries on the Pacific coast, but sales of second-hand machinery and low prices for new have been felt by the trade. Mining operations are creating some new demand.

New York

NEW YORK, March 27, 1912.

Inquiries are more than usually plentiful in New York. Individually they are ordinary in character, but their number convinces the trade that exceptionally good business will develop as soon as purchasing agents and other buyers get word to spend the money required. That there is a sound basis for business when activity does come is a view accepted by the trade. The facts are such as to maintain cheerfulness despite the quiet period lately experienced. The orders which have been received have been mostly from large industrial plants and from many directions. The American Can Company has been buying a few tools for various of its plants and the Crocker-Wheeler Company and a large pump concern have also been in the market. A recent heavy placing of orders for locomotives is expected to awaken some demand from the builders. The call for second hand machinery has continued very good.

The price of leather belting has been advanced about 5 per cent. by some manufacturers, probably because of their being compelled to purchase hides at recent figures. They have been confronted by prices 10 to 15 per cent. higher than those of early 1911. Recent consular reports from South America say that the balata industry is suffering severely from lack of rain. American manufacturers who depend on the supply from the three Guianas are likely to be seriously affected. The product is one largely used in belt manufacturing.

The Hawkins & Barnett Machine Company, Trinidad, Col., is inquiring in this market for a line of centrifugal pumps for irrigation purposes. The firm will dispose of the pumps in the Southwest.

The Bayonne Launch Company is erecting an addition, 65 x 75 ft., to its plant at the foot of East Thirty-seventh street, Bayonne, N. J. It will be used for manufacturing purposes and some additional wood-working equipment will be required. The company states that the growth of the business requires increased factory space and that other improvements will be made in the near future.

The Brady Brass Company, Tenth and Grove streets, Jersey City, N. J., is reported to be contemplating the erection of a new factory at Fourteenth and Fifteenth streets in that city on property recently acquired. Details are not yet available.

The Weldon Roberts Rubber Company, Newark, N. J., has been incorporated with \$100,000 capital stock to manufacture erasers and rubber specialties. The company is planning the erection of a factory building at 117-119 Mechanic street, and it is understood will soon be ready for its equipment which comprises general and special rubber working machinery.

The Village of Mount Morris, N. Y., will issue \$140,000 in bonds for the construction of a new water-works system. J. Aubrey Striker is secretary of the village board.

The American Knife Company, Baldwinsville, N. Y., recently incorporated, is planning the erection of a new building which will be equipped with the latest improved machinery for the manufacture of paper, stave and high speed knives.

The Gridley, Fuhrman & Martin Company, Elmira, N. Y., has been incorporated with \$40,000 capital stock to manufacture and deal in hardware fixtures and sup-

plies. The incorporators are C. H. Gridley, H. K. Fuhrman and B. E. Martin.

The Case Brothers Cutlery Company, Little Valley, N. Y., whose plant at that place recently burned, is contemplating removal to Springfield, N. Y., where a manufacturing site is being negotiated.

The Jamestown Lighting & Power Company, Jamestown, N. Y., has been authorized by the Public Service Commission to construct and equip an electric lighting plant at Celeron, a suburb. Frank W. Bullock, Jamestown, is superintendent.

The Lewiston & Lake Ontario Shore Power Company is completing plans for a transformer station to be constructed at Lewiston, N. Y., to supply power to Lewiston and to Youngstown at the mouth of the Niagara river.

The Rochester Railway & Light Company, Rochester, N. Y., is preparing plans for a new power station to be known as Station No. 36.

The Auburn Thread & Twine Company, Auburn, N. Y., has been incorporated by H. L. Ferris, C. H. Steel and W. Acheson of Auburn, with a capital stock of \$36,000, and will engage in the manufacture of thread and twine.

The Freihofer Vienna Baking Company, Philadelphia, Pa., is having plans prepared for a bakery and stable 112 x 254 ft., of brick and steel construction which it will erect and equip at Troy, N. Y.

The Buffalo Electric Vehicle Company, Buffalo, N. Y., has been incorporated with a capital stock of \$1,000,000. It is a merger of five Buffalo automobile concerns and is to manufacture pleasure and commercial vehicles. The directors named are W. J. P. Seipp, W. C. Fuechter, Thomas B. Wheeler, Frank E. Lane and Marcus A. Alexander of Buffalo. The temporary offices of the company are at 684-686 Ellicott Square Building. Details regarding the manufacturing plans will be furnished later.

The Protective Registers Company, Buffalo, has been incorporated with a capital stock of \$150,000 and has established a factory at Jamestown, N. Y., for the manufacture of office filing and registering devices. The headquarters will be in Buffalo with offices at 626 Fidelity Building. The directors are: W. J. Penfold, C. S. Huber, Buffalo; E. H. Huber, Lockport, N. Y., and J. Boardman Scovell, Niagara Falls, N. Y.

New England

BOSTON, MASS., March 26, 1912.

The improvement in business has been accentuated. The general feeling is better, and is emphasized by increasing orders. A notable example of this is in the grinding machine trade; good orders are being received, including lots of considerable size. A characteristic of the situation so far as machine tools is concerned is that orders are from widely diversified industries.

The report that a general consolidation of textile machinery industries is in progress is now believed to be without foundation. Certain specialized branches of the business may be coming nearer together, but if any amalgamation is under way it will not be a sweeping one.

The business of the Laconia Car Company, Laconia, N. H., has been reorganized by a new corporation

backed by prominent financial interests, principally of Boston. Cornell S. Hawley, formerly president and treasurer of the Consolidated Car Heating Company, Albany, N. Y., is the president and business head of the company, and Henry B. Tilton, for many years head of the Laconia works, continues as general manager. The directors are Craig Colgate, New York; Harold J. Coolidge, Louis A. Frothingham, President Hawley, William H. Hill, Henry Hornblower, P. L. Hughes, William L. Putnam, P. W. Whittemore, Henry C. Wiley and Robert Treat Paine, 2d, all of Boston. The capitalization consists of \$1,000,000 7 per cent accumulated preferred stock and \$1,000,000 common stock. The prospectus states that the company's net earnings have averaged over \$200,000 a year for five years. The business was established in 1842 and at the present time 1000 men are employed. Those in the trade who are familiar with the property believe that heavy improvements will be made in equipment. The company has recently begun the manufacture of small steel cars.

The Berkshire Motor Company plans to erect a plant at Cambridge, Mass., consisting of a three-story manufacturing building 50 x 239 ft., with provision for two additional stories later. The structure will be of reinforced concrete. A boiler house will be 24 x 29 ft.

The Pope Mfg. Company, Hartford, Conn., builder of automobiles, will erect a reinforced concrete building 70 x 193 ft.; four stories. It will be used for manufacturing purposes, the company stating that the growth of the business requires increased factory space.

Mark W. Bushnell, Thompsonville, Conn., has been appointed temporary receiver of the Simplex Mfg. Company, Middletown, Conn. The recent annual meeting of the company resulted in a radical change in the board of officers.

The new building of the Dairy Machinery & Construction Company, Derby, Conn., will be 53 x 180 ft., two stories with steel trusses, beams and columns.

The business of the Parker Transmission Company, manufacturer of transmission apparatus has been moved from Springfield, Mass., to Fulton, N. Y. The transmission is the invention of Charles W. Parker, formerly with the Lamb Knitting Machine Company, Chicopee, Mass. The reason for the removal is that the large amount of new capital required to continue the business on a large scale was furnished by the Hunter family of Fulton, who are large manufacturers. John Hunter has become president of the Parker Company and Thomas Hunter the treasurer.

The Champion Horseshoe Company, Pawtucket, R. I., which has just purchased the Pawtucket Foundry Company property in that city, has been incorporated under Rhode Island laws. Edwin A. Smith is president, George L. Bowen, vice-president and general manager; Donald E. Jackson, secretary and treasurer, and George L. Markley, assistant general manager. Eli Batty is superintendent of the plant and James E. Batty, assistant superintendent. The active men in the company have been prominently associated with the Rhode Island Perkins Horseshoe Company, Valley Falls, R. I. Mr. Bowen was connected with the company as its general sales agent, Mr. Markley was the western representative, Eli Batty the assistant superintendent and James E. Batty the master mechanic. Edwin A. Smith is a wealthy resident of Providence. The new company has purchased its equipment and expects to have goods on the market in June.

The Wallingford Company, Wallingford, Conn., manufacturer of electroplated ware, which is to erect a large building this spring, is not yet able to state what equipment will be required beyond the fact that electro motors will be used throughout the factory and an elevator and an automatic sprinkler system will be installed. The company has a good deal of machinery in the building which it is to vacate when the new structure is completed.

The Hart & Cooley Company, New Britain, Conn., states that no equipment will be required for the building, the contract for which has just been placed.

The Southington Mfg. Company, Southington, Conn., has been incorporated in Connecticut and will begin business with \$15,000 capital stock. The incorporators are Matthias F. Mohr, Wilhelmina L. Mohr, and William H. Mohr. It will manufacture tools and hardware. The company states that no machinery will be purchased at present.

The American Pump & Engineering Company, Hartford, Conn., has incorporated in Connecticut, the incorporators being Earl Sexton, Worcester, Mass., president and treasurer, and Elwin L. Austin, and George W. Callaway of Hartford. The company will handle and install all kinds of pumps and engines, but will not manufacture for the present.

The business of P. J. Harrison Son Company, manufacturer of folding chairs, and the piano stool business belonging to the estate of John Roe, both of Winstead, Conn., have been consolidated.

The mill of the Milton Leather Board Company, Milton, N. H., was destroyed by fire March 20 with a loss of \$20,000.

The National Equipment Company, Springfield, Mass., will establish a new plant at Brightwood. The main building will be 80 x 360 ft., three stories, with a wing 80 x 100 ft. It will be of brick, mill construction, with steel beams. A power house will also be erected.

The Sessions Foundry Company, Bristol, Conn., will erect a fireproof pattern storage building, 50 x 100 ft. and five stories. It will be of brick with reinforced concrete floors and roof.

The Middletown Electric Light Company, Middletown, Conn., is to double the capacity of its power plant and will build an addition and will install a coal elevator and conveyor.

The Bristol Company, Waterbury, Conn., manufacturer of measuring instruments, will add another story to a building 50 x 100 ft., one story.

The Embalmers Supply Company, Westport, Conn., will erect a building 45 x 100 ft., one story.

Philadelphia

PHILADELPHIA, PA., March 26, 1912.

Business continues on a very irregular basis. In a few instances manufacturers are a trifle better engaged, with here and there a better run of miscellaneous orders reported. The local locomotive builder continues to take on a moderate volume of orders and indications point to increased activities. Machine tool builders do not generally announce much improvement, although special machinery and equipment makers have been taking a few more orders. The uncertainty which surrounds the conferences between coal miners and operators, both in the anthracite and bituminous fields, continues to exert a retarding influence on general business. That there will be a cessation of operations in the anthracite region is practically certain. Consumers of fuel have been steadily accumulating supplies and unless the suspension of operations be prolonged they hope to tide over without serious inconvenience.

A better volume of business has been coming to the steel casting plants in this vicinity, largely due to the recent betterment in railroad equipment buying, orders for materials for which are now coming out. Occasional betterments in conditions are also heard from gray iron and from malleable iron foundries.

A moderate volume of business is being done in power equipment and in second-hand machinery. The demand is still spotty and irregular.

The Knight Mfg. Company, Lancaster, Pa., has been incorporated under the laws of Pennsylvania with a capital stock of \$10,000 and has taken over the business of the East End Iron Works, 401 and 403 Chestnut street, in that city, formerly conducted by F. H. Knight. The business of manufacturing structural iron work, fencing, window guards and miscellaneous iron work will be continued.

Notice of the proposed incorporation of the Baldwin Locomotive Works, Chicago plant, under Pennsylvania laws to conduct the business of the company's new Western plant, has been filed. William L. Austin, Alba B. Johnson, Samuel M. Vauclain and William Burnham are named as incorporators. Formal application for the charter will be made April 15.

Isaac A. Sheppard & Co., Excelsior Stove Works, are now taking bids for a second group of buildings for their new plant at Sepviva street and Erie avenue. These are for the construction of buildings Nos. 4, 5, 6, 7 and 8, including a supply building 34 x 74 ft.; a warehouse 19 x 67 ft., two stories; a power house 48 x 67 ft.; a pattern shop, pattern storage and core shed building 42 x 142 ft., two stories, and a stable and garage 33 x 82 ft., two stories. Work on buildings Nos. 1, 2 and 3, comprising the foundry and finishing departments, is now under way. The new plant is expected to be ready for occupancy early in the summer. The power equipment at the present plant is to be transferred to the new one as soon as practicable. Some few additional machine tools will be required for the new plant, but the matter of their purchase has not yet been considered.

The Peerless Roller Bearing & Appliance Company has been incorporated under the New Jersey laws with

a capital stock of \$300,000 to engage in the manufacture of roller bearings, automobiles, trucks, etc. Pan-nock E. Sharpless, Ward, Pa.; William H. Kneedler, Lansdale, Pa.; Isaac Michener, Jenkintown, Pa., and J. Roberts Jarrett, Haddonfield, N. J., are named as incorporators.

The Nipper Machine Company, Norma, N. J., has been incorporated with a capital stock of \$25,000 and will engage in the manufacture of small machinery specialties. Maurice and Joseph Fels, Philadelphia, Pa., and E. H. Sawyer, Vineland, N. J., are named as incorporators. It is understood that the mechanical equipment for the plant has not yet been acquired.

Berko Brothers, wire workers, 327 North Randolph street, have plans in progress for a four-story concrete factory building 60 x 95 ft., to be erected at Randolph and Wood streets. Pueckert & Wunder are the architects. The purchase of the necessary power equipment has not yet been decided upon. Considerable machinery equipment will be purchased at a later date.

William H. Grundy & Co., Bristol, Pa., have been taking bids for a one, two and three-story brick, concrete and steel factory building to be erected at Bristol, Pa., from plans by C. T. Main, Boston, Mass. Electric lighting and steam heating are included.

The American Die & Tool Company, Reading, Pa., is very busy on a large and varied line of work, including tools and special machinery, as well as gear work for automobiles. For the latter class of work the demand has been particularly heavy.

The Mack Bros. Auto Company, Allentown, Pa., has acquired the plant of the Unity Silk Company of that place and after some alterations will equip it with machinery for the manufacture of trucks.

Chicago

CHICAGO, ILL., March 26, 1912.

The Kropp Forge Company, 2510 West Twenty-first street, Chicago, has been organized to take over the business and plant of Sundberg, Kropp & Co. The plant is being enlarged by the addition of the adjoining two-story building, 60 x 120 ft. New equipment will also be added in the near future. Officers of the company are Charles A. Kropp, president and treasurer; Wm. Ganschow, vice-president, and O. C. Niss, secretary.

The Nashold Centrifugal Machinery Company, Chicago, has been organized with a capital stock of \$100,000 by Menze Nashold, Earl Gould and Leonard Knott. The company will do a general manufacturing machinery business.

The Buchanan Electric Steel Company, Chicago, has increased its capital stock from \$150,000 to \$250,000.

The Baird Equipment Company, Chicago, has been incorporated with a capital stock of \$10,000 to manufacture electrical and mechanical goods. Incorporators are Robert C. Wheeler, Cecil Barnes and Charles L. Cobb.

The Chicago Electric Motor Car Company, Chicago, has been organized with an authorized capital stock of \$110,000 to manufacture automobiles and accessories. The incorporators are David F. Rosenthal, Leo S. Kositchek and J. L. Gossman.

The Aurora Automatic Machinery Company, Aurora, Ill., has completed plans for the erection of a modern machine shop, 100 x 150 ft., one story, to be built on Clain street.

Groomes & Elson, cigar manufacturers, Chicago, have been issued a building permit for the erection of a three-story brick factory at 1718 North Robey street, to cost \$30,000.

The Anderson Light & Specialty Company, Chicago, has been incorporated with a capital stock of \$40,000 to manufacture gas and electrical supplies. The incorporators are Andrew A. Anderson, Gratia S. Anderson and Hugh A. Caperton.

The Urbana Automobile Company, Campaign, Ill., will erect immediately an addition, 100 x 50 ft., of brick and concrete construction, to its garage. When completed the building will have a floor space of 12,000 sq. ft.

A. D. Huesing, Rock Island, Ill., has let the contract for the erection of a bottling works building and garage at Fourteenth street and First avenue. The garage will be 30 x 40 ft., one story, and of brick construction, and the bottling works building is to be 80 x 100 ft., with a concrete foundation. New machinery will be installed.

The Rock Island Bridge & Iron Works, Moline, Ill.,

has been organized with a capital stock of \$30,000 by M. H. Kanary, Walter G. Murphy and Edward Manhard. The company will fabricate and erect structural steel.

The P. A. Wetzel Mfg. Company, Rockford, Ill., with \$25,000 capital stock, has been organized to equip a plant for the manufacture of furniture and office supplies.

The Crete Mfg. Company, Crete, Ill., has increased its capital stock for the purpose of increasing its manufacturing equipment.

The Newport Mining Company, Milwaukee, Wis., has completed contracts for the construction of a plant at Bay Minette, Ala., for the manufacture of naval stores on a large scale. The plant, it is stated, will involve an investment of about \$1,000,000.

The city of Madison, S. D., will receive bids through William Rae, city auditor, for furnishing one oil engine, two motors and pump.

The city of Aguilar, Colo., will receive bids until June 1, through the city clerk, for the construction of a water works system, estimated to cost \$70,000.

Cleveland

CLEVELAND, OHIO, March 26, 1912.

A fair volume of business in scattering orders, which were mostly for single tools, came out in the past week. Some sales of lots of three or four tools were the largest made. Considerable new inquiry is developing for single tools and generally an inquiry of this character results in the placing of order without much delay. The demand is almost entirely for small and medium-sized tools and much of the business is coming from new concerns that are starting up in a small way. One or two local dealers are figuring on an inquiry from the Big Four Railroad for about 20 tools for shops in Indiana. This is the first railroad list of any size that has reached this market in many months. There is a fair demand for second-hand machinery. The supply at present is very liberal.

The P. D. Crane Company, Cleveland, Ohio, has been incorporated with a capital stock of \$10,000 by P. D. Crane, Julius Bloomberg, B. A. Crane, M. D. Crane and G. V. Wolf. The company will take over the business of the Langner Mfg. Company at 950 East Sixty-seventh street, maker of wrought iron columns for buildings and builders' supplies.

The Crooks-Uhle Mfg. Company, Bucyrus, Ohio, has moved into larger quarters on East Charles street in that city and will erect an addition 34 x 66 ft. The company does machinery repair work and manufactures go-cart runners and folding sulkies for children.

The plant of the Union Foundry & Machine Company, Mansfield, Ohio, has been sold by John D. Niman, who has been operating it for 40 years, to John E. Keener of Columbus, Ohio. The new proprietor is considering enlarging the plant. In addition to doing a general foundry business and making the present products it is the intention also to manufacture gasoline engines and electric supplies.

The Burch Plow Works Company, Crestline, Ohio, has bought property adjoining its present plant and will make extensions. A new addition will be built to its molding department. J. L. Morrow is secretary.

A large manufacturing plant will be built in Columbus, Ohio, for the G. Edwin Smith Shoe Company by the Longwater Realty Company, which has been incorporated with a capital stock of \$75,000. George T. Spahr is president. A seven-story reinforced concrete building will be erected, plans for which are now being prepared.

It is announced in Akron, Ohio, that a new automobile plant will be established in that city by the Ideal Commercial Company, which has been temporarily organized in Detroit, Mich. The company will be incorporated with a capital stock of \$200,000. J. C. Sage is president. The factory will be located in the building now used by the Giblo Machine Company in East Akron.

The Big Four Railroad through its purchasing department in Cincinnati has an inquiry out for about 20 machine tools for its shops in Deach Grove, Ind. The list includes lathes, planers, shapers and drill presses. Medium-sized tools for the most part are wanted.

The Lake Shore & Michigan Southern Railroad is planning the expenditure of \$2,500,000 in improvements at Airline Junction, Ohio, near Toledo. These will include some repair shops and two roundhouses, each having a capacity of 15 locomotives.

The Aultman & Taylor Company, Mansfield, Ohio, will erect a new building 62 x 80 ft. to be used as a loading department. It is expected that it will be equipped with a large traveling crane.

The Beach Enameling Company, Coshocton, Ohio, has been incorporated with a capital stock of \$100,000 by H. D. Beach, H. L. Beach, L. K. Beach, C. J. Bowen and F. E. Pomerine.

The City Council of Alliance, Ohio, has passed legislation recommending a bond issue for \$140,000 for improving the municipal water system. Plans provide for a filtration plant and the building of a stand pipe.

The Steubenville Broom Company, Steubenville, Ohio, has been incorporated with a capital stock of \$10,000 and will install machinery for the manufacture of brooms. Harry Zink is president, John Thornbers is secretary and treasurer.

The Strong Mfg. Company, maker of enamelware, which will move its plant from Bellaire to Sebring, Ohio, has commenced the erection of a plant in the latter place, 300 x 600 ft.

The Cleveland Metal Joint Company, Cleveland, Ohio, has been incorporated with a capital of \$35,000 by Richard M. Corcoran, Henry W. Lamart and others.

The Cottage Creamery Company, Orville, Ohio, is in the market for a gas engine power plant.

The Champion Bed Spring Company, Cleveland, which will shortly move into a new plant, will buy some new equipment, including motors and machine tools.

The Sloan House, Sandusky, Ohio, is planning the installation of a power plant and will probably buy a gas engine and generator.

The Conneaut Shovel Works, Conneaut, Ohio, will add a handle department to its plant. Some wood-working machinery will be required.

The Berger Mfg. Company, Canton, Ohio, will enlarge its plant by the erection of a four-story building 80 x 300 ft.

Plans for a municipal water system and filtration plant for Akron, Ohio, have been approved by the State Board of Health.

The Greenberg Creamery Company, Cleveland, Ohio, is installing a refrigerating plant and is in the market for a gas engine power plant.

Cincinnati

CINCINNATI, OHIO, March 26, 1912.

The export trade has lately furnished some excellent business to a number of local machine tool builders. Last week representatives of two large export houses were in Cincinnati, and it is understood that they distributed quite a number of good-sized orders for different kinds of tools. The domestic trade situation is unchanged, and it is probable that the inquiry is a trifle lighter than the previous week's record.

Second-hand power plant equipment is in good demand. Many manufacturers are economizing by purchasing rebuilt boilers, engines and generators, and this particular business will probably be in good shape for several months to come.

Several of the jobbing foundries report a slight let-up in their business, but as a whole the change is not appreciable.

The Cincinnati Section of the Associated Foundry Foremen held its regular monthly meeting at the Grand Hotel on the evening of March 23. A number of foundrymen from Springfield and Hamilton were in attendance to hear a lecture by Henry M. Lane, of Cleveland, on "Testing of Core Mixtures and Core Oven Temperatures."

It is quite probable that the Cincinnati Business Men's Club will soon call for bids on an electric lighting plant to be installed in its building at Ninth and Race streets.

The Superintendents' and Foremen's Club of Oakley, Cincinnati, held a meeting on the evening of March 21 in the new auditorium of the Cincinnati Milling Machine Company. Ralph F. Flanders of the Fellows Gear Cutting Machine Company, Springfield, Vt., gave a very interesting illustrated talk on "Gears and Gear Cutting," which was followed by a spirited discussion participated in by nearly all members present.

Walter G. Franz, Union Trust Building, Cincinnati, has been awarded the contract for the Cincinnati Tuberculosis Hospital that will cost about \$350,000. A large power and light plant will be required.

It is rumored that the National Steel Post & Fabric Company, Enid, Okla., is considering moving its plant to Cincinnati in case a favorable site can be secured.

The Norwood Machine Company, Norwood, Ohio,

will erect a garage 60 x 110 ft., one story and of brick and steel construction. A small repair shop will be installed in the new building.

The Cincinnati Precision Lathe Company, whose plans were recently mentioned, has completed its plant at Mt. Washington and has already commenced operations. The officers of the new company are: President, M. A. Stewart; vice-president, J. M. Tatman, and secretary, W. C. Tatman.

To handle machinery of all kinds the Kanawha Engineering Company has been incorporated at Charleston, W. Va., with \$5,000 capital stock. Thomas J. Camack and E. M. Scaggs are named among the incorporators.

The Standard Electric Tool Company, Cincinnati, is a new incorporation with \$10,000 capital stock to manufacture machine tools and electrical appliances. The incorporators are: Frank H. Kunkel, Earl W. Griffin, Frank P. Hamilton, H. L. Auscholz and Marston Allen. The new company expects to be able to announce its plans within the next 10 days.

The Reno-Kaetker Company, Cincinnati, has been incorporated with \$15,000 capital stock. The company has a plant at Sixth and Baymiller streets for the manufacture of motors, generators, swingsaws and other specialties, and its business has heretofore been done under a partnership arrangement. Frank P. Colville is sales manager. No immediate extensions are planned.

The Herschede Hall Clock Company, Cincinnati, has acquired a site at McMillan street and Essex place, on which it intends to erect a modern factory. Its present location is 1011 Plum street.

The Ahrens Iron Works Company, Cincinnati, is installing in its structural steel plant on Colerain avenue an extra large shearing machine. The company has lately been able to increase its working time to 54 hours a week.

Detroit

DETROIT, MICH., March 26, 1912.

There is a slight increase in the demand for machinery of standard type, both in Detroit and in the up-state manufacturing centers, reports from Grand Rapids being particularly encouraging. Inquiry for large amounts of equipment are lacking, but numerous orders for small lots of metal working tools and general shop equipment are being placed and considerable business along this line is before the trade and the outlook is quite promising. The demand for pumps and accessories is active, municipal needs figuring largely in this connection. The automobile makers are doing some buying, but are not in the market to the extent that might be looked for in view of the tremendous activity in this industry. Used tools in good condition are in fair demand, but sales are generally confined to single pieces. Contractors' and builders' outfits are moving freely and building operations are being actively carried forward on a more extensive scale than for some months.

The City Council has reported favorably on the proposition to bond for \$200,000 for the establishment of an incineration plant for the reduction of the city's garbage. The proposition will be placed before the taxpayers for ratification at an early date.

The Crittall Casement Company has been incorporated with \$25,000 capital stock to manufacture builders' supplies. The stockholders include Ralph E. Gilchrist, Henry E. Fletcher and Clarence W. Davock.

The Pope Baking Company is erecting an addition 50 x 30 ft. to its plant on LeMay avenue, for which some equipment will be required.

The English Company has been incorporated with \$5,000 capital stock by Walter P. English and Theodore G. Sprague of Detroit and Mendel Cerf of Flint. The company will engage in the manufacture of motors and accessories.

President Delano of the Wabash Railroad has announced that the company will erect a large roundhouse and otherwise improve its terminal facilities at Delray, a Detroit suburb.

The Kling Brewing Company has under construction a three-story brick and steel addition to its plant at Jefferson and Field avenues.

The Derward Nebulizer Company has been organized with a capital stock of \$10,000 to manufacture atomizers and other specialties. The incorporators are: J. Harry Conley and Edwin D. Merritt.

B. F. Tobin, president of the Continental Motor Mfg. Company, Muskegon, Mich., has issued a signed statement denying published reports that the company's plant would be dismantled and the equipment moved

to Detroit for use in the new plant which the company is completing there. The company is now purchasing tools for the Detroit plant.

At the annual meeting of the Lavigne Mfg. Company the following officers were elected: President, J. P. Lavigne; vice-president, P. D. Dwight; treasurer, C. L. Brumme; secretary, N. H. Henwood. The company has disposed of its steering gear business to the Lavigne Gear Company and will devote its entire plant to the manufacture of brass and aluminum specialties. An excellent volume of business is reported.

The Metal Furniture Company, Grand Rapids, Mich., has been organized with a capital stock of \$75,000 to manufacture iron furniture. A factory site has been secured and a building will be erected at once. A. W. Hompe is president and P. M. Wege secretary of the new company.

The Holland Rod Company, Holland, Mich., has been organized with \$60,000 capital stock for the manufacture of metal fishing rods and other specialties. The directors are: G. E. Kollen, John Grower and C. DePree.

W. B. Stiles, Grand Rapids, Mich., will erect a 50-barrel flour mill and a large grain elevator at Sparta, Mich. Complete equipment will be required.

The Petoskey Block & Mfg. Company, Petoskey, Mich., is preparing to rebuild its woodworking plant which was recently burned.

The city of Morenci, Mich., is considering the installation of a waterworks system.

The Rumsey Wool Stock Company, Detroit, has completed plans for the erection of a two-story factory 40 x 100 ft. at Romeo, Mich.

The City Council of Negaunee, Mich., is asking for bids on a new pump for the waterworks plant to have a capacity of 2,000,000 gal. a day.

The Northwestern Leather Company, Manistique, Mich., has had plans prepared for an addition to its tannery plant. The building will be of brick 50 x 200 ft.

The Manistee Motor Company, Manistee, Mich., has been incorporated with \$51,000 capital stock and will engage in the manufacture of automobiles. The officers of the company are: Charles Elmendorf, president, and George M. Burr, secretary and treasurer.

The Vassar Knitting Company, Bay City, Mich., has increased its capital stock from \$25,000 to \$50,000 for the purpose of increasing its mechanical equipment. E. Y. Hogle is president.

The Muskegon Motor Specialty Company, Muskegon, Mich., has increased its capital stock from \$30,000 to \$100,000 and will extend its manufacturing operations.

The taxpayers of Deckerville, Mich., have voted to bond for \$11,000 for waterworks.

The village of Hartford, Mich., has decided to issue bonds for waterworks extensions; \$4,000 will be spent on the improvements.

The Lyons Machine & Mfg. Company, Muskegon, Mich., has been organized with \$10,000 capital stock to manufacture mechanical devices. The incorporators are: William F. Ordell, R. H. Hill and R. F. Mohrhardt.

The Central Mfg. Company, Kalamazoo, Mich., has been incorporated with a capital stock of \$10,000 and will engage in the manufacture of paper mill supplies.

S. M. Carpp, Hartford, Mich., will establish a canning factory at Breedville, Mich.

In connection with the erection of its sugar factory at Pigeon, Mich., the Michigan Sugar Company, Detroit, is planning the establishment of a pumping station on Saginaw Bay to supply the factory at a point 6 miles from Pigeon.

The I. Stephenson Lumber Company is enlarging the capacity of its flooring plant at Escanaba, Mich., and installing additional machinery. The dry kiln capacity will also be doubled.

The Lansing Iceless Packer Company, Lansing, Mich., recently incorporated, will equip a plant for the manufacture of its product and is in the market for sheet metal working machinery, baking and enameling ovens, etc.

The Central Mfg. Company, Kalamazoo, Mich., recently incorporated for the purpose of operating a foundry and to manufacture paper mill supplies and machinery, has secured a factory location at Litcher and Ransom streets and will immediately begin its erection.

The Metal Office Furniture Company, Grand Rapids, Mich., recently incorporated with a capital stock of \$75,000, is planning the erection of a factory on its property at South Division street and the Pere Marquette crossing. The company will manufacture a line of steel cabinets.

The South

LOUISVILLE, KY., March 26, 1912.

In spite of weather conditions remaining unfavorable business is holding up pretty well, and the outlook is good. As soon as normal spring weather puts in an appearance it is expected that business in all lines will be stimulated. The demand for power plant equipment has dropped off in the last week or two, and a smaller amount of new machinery of this kind is being bought. It is suggested that this may be due to the increased use of electric current by manufacturing plants.

Oil well machinery manufacturers are devoting a good deal of time at present to the Wayne county oil fields of Kentucky. In this and other Eastern Kentucky districts petroleum has been found in paying quantities, and many new developments, involving the purchase of a large amount of machinery, are under way.

The Sutherland Automobile Air Appliance Company, Louisville, has been incorporated with \$10,000 capital stock for the manufacture of an automobile specialty. L. Sutherland, C. Burba and M. W. McGrath are the incorporators.

The James Clark, Jr., Electric Company, Louisville, has completed the installation of motor equipment in the plant of Richard Hentzmann, ornamental iron manufacturer. The latter is offering his boiler and engine for sale.

The C. Lee Cook Mfg. Company, Louisville, maker of metallic packing, has ordered a 25-kw. motor generator set from L. Chalmers Bullock. The company will continue to generate power for the operation of its motors in the winter, when steam for heating is required, but in the summer will use current from a local central station.

Business has been good with the Henry Vogt Machine Company, Louisville, both in the boiler and power equipment divisions, but there are not so many inquiries as heretofore, and it is expected that trade will begin to taper off from now on. A 40-ton ice plant has been sold to Murray & Schmidt, Sedalia, Mo.; a 20-ton outfit to the Public Printer, Washington, D. C., and a 20-ton plant to Conron & Bros., New York.

The Pineville Lumber & Mfg. Company, Pineville, Ky., has been incorporated with \$10,000 capital stock by Ben R. Smith, R. W. Johnson and others. It is now erecting a planing mill and will install woodworking and power equipment.

A reorganization of the Kosmos Portland Cement Company, Louisville, which has a large mill at Kosmosdale, Ky., is being planned. It is expected that C. M. Dugan, the present manager, will acquire control of the stock. Many improvements have been contemplated in the plant, and it is expected that these will be put into effect as soon as the change is completed.

The Booneville Light & Power Company, Booneville, Ky., has been organized with \$1,500 capital stock by H. C. Combs, T. C. Fuller and C. B. Moore.

The Domestic Water Company, Shepherdsville, Ky., has been organized. Plans for a small water-works system are being made. The incorporators are W. T. Lee, R. L. Troutman and J. F. Combs.

Frazer & Bush, contractors, Lexington, Ky., have been given the contract for the erection and equipment of the electric light plant of Falmouth, Ky. It will cost \$10,000.

The City Council of Paris, Ky., has voted in favor of erecting a municipal electric light plant. The finance committee is now determining what the cost of the plant will be, following which arrangements to finance it will be made.

It is rumored that the Illinois Central Railroad Company is making plans to move its large repair shops from McComb City and Water Valley, Miss., to Jackson, Miss., where extensive buildings will be erected.

The Rineyville Roller Mills Company, Rineyville, Ky., has been incorporated with \$10,000 capital stock by F. A. Wiseman, H. C. Beatty, R. M. Hill and others. The company will erect a flour mill, and plans are now being completed.

The Baldwin Packing Company, Paris, Ky., has been organized with \$40,000 capital stock by F. L. Lapsley, George Wyatt and others. It will erect a plant, the operation of which will require a considerable amount of refrigerating equipment.

Jacobs Bros., Nashville, Tenn., will erect a sausage factory in that city. It will be located at Taylor and Adams street, and will cost \$15,000. Cold storage will be provided for by refrigerating equipment.

Schulz & Boyer, Birmingham, Ala., are moving their button factory to Knoxville, Tenn. Mussel shells from the Clinch and Tennessee rivers will be used in the manufacture of the company's product, and the plant will enlarge its operations.

Edwin T. Lindsey, representing D. C. Eckle, Chicago, has contracted with the Business Men's Club of Ridgeley, Tenn., for the erection of a cotton oil mill to cost \$125,000. The club has furnished a site on which the mill will be built. Power machinery and other equipment will be required.

The Vida Ore & Mfg. Company, of which C. D. Smith, Memphis, Tenn., is president, is reported to have completed plans for the installation of a plant for handling 1000 tons of iron ore to be taken out at Sweetwater, Tenn. The company has been incorporated with \$300,000 capital stock.

The H. L. Reynolds Lumber Company, Dayton, Tenn., will erect a planing mill and spoke factory. It now operates a sawmill at that point.

The city of Knoxville, Tenn., is contemplating making improvements in its water plant. A large number of mains will be laid and extended.

Dugger & Willis have purchased the plant of the Mt. Pleasant Machine Company, Mt. Pleasant, Tenn., and will erect in connection with the machine shop a foundry, which will be developed to serve the phosphate mills being erected in Mt. Pleasant and adjacent points.

The Pulaski Ice & Storage Company, Pulaski, Tenn., is to double the capacity of its plant.

H. H. Hitt, Falkville, Ala., is erecting a large sawmill at Decatur. The contract for the band-mill has been let to the Allis-Chalmers Company. A planing mill will also be constructed.

The American Box Company, Lynchburg, Va., is asking for prices on used power equipment, including a 50-hp. boiler and engine.

The Highland Park Mfg. Company, Charlotte, N. C., is in the market for a 250-kw. generator. A direct-connected engine is also needed.

The Davidson Lumber Company, Camden, S. C., is inquiring for quotations on a 75-hp. Corliss engine.

D. A. Burwell, Stovall, N. C., who is establishing a plan factory at that place, is in the market for a small planer, boring machine, punch, shear and wood handle working equipment.

The municipality of Titusville, Fla., will receive bids until May 20 for the construction of a water-works system.

Clarksville, Miss., will receive bids until April 2, through W. S. Bobo, city engineer, for furnishing one 250-hp. boiler and feed pump.

Indianapolis

INDIANAPOLIS, IND., March 26, 1912.

The Gibson Motor Starting Company, Indianapolis, has been organized with an authorized capital stock of \$5,000, to manufacture and sell motor starters. The incorporators are R. K. Allison, Bert Gibson and R. B. Allison.

The George J. Hoffman Company, South Bend, Ind., has been awarded the contract for the erection of an addition to its factory. The new building will be 130 ft. long and one story of brick and stone construction and is estimated to cost \$12,000.

The factory of J. M. Buck & Co., Bluffton, Ind., which was recently destroyed by fire will be rebuilt within a short time.

The South Bend Watch Company, South Bend, Ind., has completed a three-story addition to its plant.

The Citizens Gas Company, Indianapolis, has awarded a contract for a gas holder, with 3,000,000 cu. ft. capacity, to the Stacey Mfg. Company, Cincinnati.

The George Cutter Company, South Bend, Ind., manufacturer of electrical supplies and specialties will erect an additional building for manufacturing purposes.

The Frederick L. Heintz Company, Hammond, Ind., has been incorporated, with \$100,000 capital stock, to manufacture automobile tires and accessories. The directors are L. M. Heintz, J. G. Vanderveer and Conrad Fischer.

The Viscosity Ice Machine Company, Indianapolis, has been incorporated, with \$75,000 capital stock, to manufacture ice-making machinery. The directors are W. L. Holden, C. E. Andrews and W. H. Ballard.

The International Lead Refining Company, East Chicago, Ind., has been incorporated, with \$500,000 capital stock, to operate a smelters plant. The direc-

tors are W. D. Thornton, A. C. Clark, J. M. Allen, Tobias Woldson and W. S. Harper.

The Victor Automobile Company, Evansville, Ind., has been incorporated, with \$8,000 capital stock, to manufacture automobile parts. The directors are P. B., W. E. and J. F. Fellwock and H. F. Nolte.

The Citizens Water & Light Company, Boswell, Ind., has been incorporated with \$10,000 capital stock, to supply public service. The directors are J. F. Brubaker, A. M. Bristor and W. B. Waddell, all of Indianapolis.

The Sullivan County Water Company, Sullivan, Ind., has been incorporated, with \$75,000 capital stock, to supply water, light and power. The directors are E. M. Kerlin, J. L. Ebner and Thomas Morrissey.

The Insley Mfg. Company, Indianapolis, maker of industrial and contractors equipment, has increased its capital stock from \$10,000 to \$20,000.

The American Automobile Corporation, New Albany, Ind., has been organized for the purpose of taking over the plant of the American Automobile Mfg. Company of that city, which is to be sold to conclude a receivership April 20. L. A. Boli, Jr., has been elected president of the corporation, with N. E. Jones secretary and treasurer.

St. Louis

ST. LOUIS, MO., March 25, 1912.

With the apparently definite opening of spring in the Southwest and the knowledge that there is more money in that section than was believed earlier, there has been an opening up of business which is having its effect on the machine tool trade, and while there has been no very great increase there are more evidences of optimism than have been apparent. The inquiry continues chiefly on single tools, with some request for second-hand stuff, the totals running into reasonably good figures, comparatively speaking.

Bids will be received at the City Hall, St. Louis, up to noon April 12 for two high-duty, triple-expansion crank and flywheel pumping engines with a 24-hour capacity of 20,000,000 gal. each, with all valves, piping, appurtenances, etc., in accordance with plans of the Board of Public Improvements of St. Louis.

Plans are being formulated, under the supervision of John H. Nolen, special agent for the State of Missouri, offices at Jefferson City, for reclamation work in the southeastern part of the State involving the drainage of 275,000 acres at a total estimated cost of \$1,300,000.

The Hammett Land & Timber Company, Huntsville, Mo., has been incorporated with \$50,000 capital stock for the establishment of sawmills and other equipment. The incorporators are J. L., J. D. and A. R. Hammett.

The Central Barrel Company, East St. Louis, Ill., has been incorporated with \$50,000 capital stock by R. H. and J. D. Puff and M. G. Jost for the establishment and equipment of a cooperage plant.

St. Louis flour and grain interests have taken up the matter of establishment at St. Louis of a modern elevator of 2,000,000 bushels capacity with modern construction and complete mechanical equipment.

The power plant at Hot Springs, Ark., supplying electricity to the city and street railway as well as private consumers, was partly destroyed by fire March 17. Considerable new equipment will be required to replace the damaged machinery.

The Missouri Stair Company, St. Louis, has completed plans for the construction and equipment of a plant larger than the one recently destroyed by fire.

The plans for the new gas plant at Edwardsville, Ill., have been completed for Paul J. Scheller, Evansville, Ind., and construction work will begin at once. Considerable machinery is involved in the enterprise.

The Monarch Metal Weather Strip Company, St. Louis, has increased its capital stock from \$40,000 to \$75,000 for the purpose of enlarging its manufacturing plant and adding new machinery.

The Dixie Electric Light & Power Company, which has prepared to build a hydroelectric plant at Cotter, Ark., in the White River, has started construction work, Federal permission having been obtained.

The Farmers' Elevator Company, Princeton, Mo., with \$50,000 capital stock, has been incorporated by R. H., V. and C. E. Hickman and G. F. M. Bradberry to build and equip an elevator at that point.

The Simplex Spreader Mfg. Company, Kansas City, Mo., with \$35,000 capital stock, has been incorporated by Q. P. Brown, F. G. Johnson and J. H. Mott. A manufacturing plant will be built and equipped.

The Star Coal Company, Galesburg, Ill., has been organized with \$51,000 capital stock to develop and

equip coal lands owned by the incorporators, Thomas, R. J. and J. W. Fairbairn.

The Board of Trade of Alton, Ill., has taken up the promotion of a large canning factory to handle the products of the farming districts surrounding that city and several towns in the vicinity.

The People's Gas Company, Pana, Ill., has been incorporated with \$50,000 capital stock to establish and equip a public service gas plant by T. J. Vidler, Warren Penwell and George A. Wittmann.

The Mazon Farmers' Elevator Company, Mazon, Ill., has increased its capital stock for the purpose of increasing the elevator equipment and enlarging its elevator.

The Upham Shoe Company, Springfield, Mo., has been incorporated with \$125,000 capital stock, which will equip a manufacturing plant at once. The incorporators are Charles B., Harry J. and M. B. Upham.

The Bladenboro Cotton Mills Company, Bladenboro, N. C., with \$300,000 capital stock, has effected permanent organization, and will proceed at once with the construction and equipment of a cotton mill of 10,000 spindles with the accompanying necessary machinery and power plant. H. C., R. L. and C. O. Bridger are the chief stockholders and officers.

The Almyra Machine Works, Almyra, Ark., has been incorporated with a capital stock of \$10,000 by E. C. Catts, G. C. Wood, J. A. Houghton, H. D. Seabee and E. P. Edwards.

The city of Topeka, Kan., will receive bids until May 7 for furnishing one 50-hp. engine and generator for its light and power plant.

Owing to a failure of its natural gas supply the Emporia Electric Light & Gas Company, Emporia, Kan., is having plans prepared by Henry I. Lea, consulting engineer, Chicago, Ill., for the reconstruction of its artificial gas plant. Bids will be asked for equipment in about two weeks.

Texas

AUSTIN, TEXAS, March 23, 1912.

While the spring planting season is somewhat backward, on account of the continued cold weather, business conditions in all lines are very satisfactory. Machinery dealers continue to report a good trade and the optimistic feeling that marked the opening of the new year still prevails.

Evidence of the serious effect the revolutionary disturbances in Mexico is having upon the machinery trade of the United States with that country is contained in a report of this Government for the year 1911 which shows a falling off of approximately \$12,000,000 in the total value of exports to our neighbor. A considerable part of this decline was in iron and steel and machinery. Our total exports to Mexico for that year were \$52,271,987, as against \$64,671,659, for the preceding year. In 1911 the value of iron and steel exports to Mexico amounted to more than \$20,000,000, cars about \$2,000,000, scientific instruments more than \$1,000,000, automobiles more than \$500,000 and agricultural implements more than \$500,000. The first three months of the present calendar year have shown no improvement in the Mexico situation, and unless there is a material betterment of conditions the present year will show a larger decline of exports to that country than the preceding one.

Plans and specifications are now being prepared for the proposed waterworks filtration plant that is to be installed at Dallas. It will provide for the handling of at least 15,000,000 gal. of water a day and will cost about \$152,000.

The City Commission of Dallas will soon order plans and specifications made for a complete municipal sewage disposal plant.

The Twyford Auto Mfg. Company which was recently organized at Houston with a capital stock of \$400,000 will install a plant for the manufacture of automobiles. Monte J. Moore is president and R. E. Twyford, superintendent.

The Wiggins Sub-Irrigation & Land Company which has a capital stock of \$1,000,000 recently purchased a tract of 10,000 acres of land near Midland, and will install a large system of irrigation thereon.

The taxpayers of La Grange will on April 2 vote on the proposition of issuing \$17,000 of bonds for the construction of a complete sewer system.

C. Runno and Son will install an irrigation pumping upon a tract of land which they own near Denton.

The Temple Ice & Cold Storage Company is enlarging the capacity of its plant at Temple.

The Farmers Gin Company will install a new cotton gin at Bishop.

N. G. Coates is establishing a sheet metal works and repair shop at Houston.

The Vermont Marble Company, Dallas, has been organized, with a capital stock of \$25,000. The incorporators are W. E. Higbee, A. M. Udall and Rhodes S. Baker.

The Urbana Gravel Company, Houston, has been organized with a capital stock of \$30,000. The incorporators are F. A. Langbehn, C. R. Cummings and G. A. Weber.

The Houston Bottling Works, Houston, has been organized with a capital stock of \$10,000. The incorporators are A. Feldman, A. F. Nicolai and Mary Ibsch.

The Archer County Oil Company, Wichita Falls, which has been formed with a capital stock of \$30,000, will operate in the oil fields of that section. The incorporators are J. J. Perkins, Cell T. Fowler and I. T. Brewer.

The Crockett Ice, Electric Light & Power Company, Crockett, has increased its capital stock from \$10,000 to \$20,000. It will make improvements to its plant.

The Dealers Ice & Cold Storage Company of Globe, Ariz., will install an ice and cold storage plant at Miami, Ariz. The ice plant will have a daily capacity of 15 tons.

The Gulf Pipe Line Company which is erecting an oil refinery at Fort Worth has completed its pipe line from Saltillo, Texas, to that city.

J. C. Port will install an irrigation pumping plant upon a tract of land that he owns near Plainview, Texas.

The Pacific Coast

SAN FRANCISCO, CAL., March 19, 1912.

The apprehension of a bad crop year in California has been relieved, and the outlook in some lines of machinery is a little brighter than at the first of the month but the machine tool market is even less active than in February. Inquiries are fairly numerous, and some of them have a promising appearance, but there is very little to report in the way of actual business. The market is still burdened with second-hand tools, and such sales of new tools as have been closed lately are said to have been at unsatisfactory prices, even small inquiries bringing out close competition.

Woodworking machinery, also, is comparatively quiet, though some agents still report satisfactory sales, both here and in southern California, and several fairly large installations are projected for the coming summer. Small engines, hoists and other equipment for logging and general development work are moving fairly well, and some important business is expected in crushing and dredging machinery. Mine operators are buying more freely, and there is a heavy demand for new metallurgical processes promising greater profit, though standard lines of equipment remain quiet. Local manufacturers have considerable mining machinery for Mexico completed and under construction, but shipments are held up pending the establishment of more settled conditions in that country. The rains have caused no perceptible decrease in the demand for irrigating outfits through the country, and a number of towns and corporations are in the market for new waterworks units.

George A. Dow, of the Dow-Mirrlees-Diesel Engine Company, now in England, has secured rights of manufacture for the United States of an engine of the Diesel type, and work is to be started shortly on a manufacturing plant near the present Dow pump works on the tidal canal at Alameda, Cal. It is reported that an investment of \$1,000,000 will be put into the plant, though no inquiry for tools is expected for several months. This company has applied for change of name to Dow-Willans-Diesel Engine Company.

Considerable machinery is to be purchased shortly for municipal and local harbor utilities. Bids have been asked on a lot of cars for the new Geary street railroad, and specifications for the power plant will be completed in about a month. The State harbor commissioners have decided to purchase another locomotive for the waterfront belt railroad, and a locomotive crane of 40,000 lbs. capacity.

The park commissioners will let a contract this week for two deep-well pumping units. L. W. Murdock is the low bidder, at \$2,370.

The Mechanical Installation Company has installed offices and a small shop at 187-189 Second street, and will engage in a general engineering and machine business, specializing on pipe and electrical work.

The Union Iron Works will shortly start construction on a \$250,000 steel steamer, powered with a 1250 hp. engine, for the Loop Lumber Company.

The Victor Combination Kitchen Boiler Company, Los Angeles, is preparing to establish a manufacturing plant at El Segundo, near that city.

Plans have been completed for a branch factory for the Ford automobile at Los Angeles.

Ground has been broken for a new foundry at Petaluma, Cal., to be operated by S. Spurgeon and C. A. Stanyer. It is announced that the new concern has no connection with the Corliss Gas Engine works at that place.

The Riverside Portland Cement Company, Riverside, Cal., is installing four new Allis-Chalmers tube mills with electric motors.

A lot of new machinery is being installed in the mill of the Eel River Valley Lumber Company, Newburg, Cal.

The Railroad Utilities Mfg. Company has been incorporated at Long Beach, Cal., with a capital stock of \$250,000, by E. C. Greer, C. O. Whittemore and others.

The capacity of the Santa Ana, Cal., sugar mill is to be increased this season from 600 to 700 tons daily.

Canada

WINNIPEG, MAN., March 21, 1912.

The outstanding feature of the situation in western Canada continues to be the amount of industrial expansion under way and contemplated. Dealers in machinery and general building supplies report a big demand. It is confidently expected that the volume of this class of business will for 1912 far surpass that of any previous year. Permits issued since the first of the year in Winnipeg and other western cities foretell a tremendous amount of building in all the country west of the Great Lakes.

Negotiations are in progress between the city of Medicine Hat, Alberta, and The Ogilvie Flour Mills Company, Ltd., Montreal, for the erection of a 3000 barrel flour mill, an oatmeal and cereal plant, to cost \$500,000, at the western city.

It is reported from Saskatoon, Sask., that A. C. Von Hagen, president of the United Flour Mills Company, Minneapolis, Minn., has practically decided that his company build a large flour mill and elevators there.

The Canadian Pacific Railway has let a contract to the J. McDiarmid Company, Winnipeg, for a six stall extension to the engine house at Swift Current, Sask., and a contract to the Carter, Hall, Aldinger Company, Winnipeg, for a six-stall engine house at Wilkie, Sask.

This season the Winnipeg portable asphalt plant will be reinforced by a stationary equipment, and a by-law to raise \$20,000 for its purchase will be submitted to the council in a few days.

In order to consider plans for the establishment of a factory for the manufacture of the various products derived from flax, Baron Edgar Bruggen, a capitalist from New York, was in Calgary, Alberta, recently.

The Saskatoon Tent & Mattress Company, Saskatoon, Sask., has received tenders for the erection of a branch factory at Regina, Sask.

It is announced that an immediate start is to be made by the city of Winnipeg in extending its artesian well system in the Poplar Springs district. The work will be completed within two years and will cost \$1,405,000.

A report from Vancouver says that the construction of the Granby Consolidated Mining & Smelting Company's plant, at Goose Bay, Observatory Inlet, B. C., will be commenced early in the spring. Apart from the development and equipment of the mine, the plant involves an expenditure of from \$1,000,000 to \$1,250,000.

The sash and door factory of Dickinson & Son, Vancouver, B. C., is to be enlarged considerably.

Dreis & Krump Mfg. Company, Chicago, Ill., makers of steel brakes, have secured a site at Chatham, Ont., where it will erect a plant from which to supply its Canadian trade.

The Oliver Plow Works, South Bend, Ind., has let contracts for the erection of two buildings at Hamilton, Ont., in addition to its large Canadian plant.

The Canadian Crocker-Wheeler Company, Ltd., which is planning the erection of a plant at St. Catharines, Ont., advises that it will require planers, boring mills, radial drills, milling machines, etc., but has not as yet prepared a list.

The Ontario Power Company, Niagara Falls, Ont., has awarded a contract to the Wellman-Seaver-Morgan Company, Cleveland, Ohio, for a 14000-hp hydraulic turbine unit, to consist of two Francis type central discharge wheels.

The Buffalo-Ontario Smelting & Refining Company, recently incorporated, will remodel a plant which it has

purchased at Kingston, Ont., and equip it for the treatment of lead, silver, and gold ores obtained from the company's mining properties.

The Colonial Whitewear Company, Guelph, Ont., has perfected plans for the erection of a knitting mill. W. H. Moore is president and general manager.

The Bowmanville Foundry Company, Bowmanville, Ont., has increased its capital stock from \$40,000 to \$100,000. A portion of the additional capital will be used for the improvement of the company's manufacturing facilities.

An Ottawa dispatch states that the Government has put through in committee of the House of Commons estimates for carrying on the coming fiscal year its vast railroad and canal construction programme, amounting to over \$38,000,000. Among the items passed were \$3,000,000 for the construction of the first section of the Hudson Bay Railroad; \$25,000,000 for construction work on the National Transcontinental Railroad, which is the eastern division of the Grand Trunk Pacific, from Winnipeg to Moncton, N. B.; \$3,000,000 for the Quebec Bridge; \$1,000,000 for construction work on the Trent Canal; \$4,158,350 for the Intercolonial Railroad; \$436,350 for the Prince Edward Island Railroad.

Government Purchases

WASHINGTON, D. C., March 25, 1912.

The Paymaster General, Navy Department, Washington, will open bids April 16, under schedule 4426, class 156, for three induction motors and one d.c. motor.

The Bureau of Supplies and Accounts, Navy Department, Washington, will open bids April 23, under schedule 4436, for one automatic cutting-off saw machine and one motor driven alligator shears.

The United States Engineers' Office, Detroit, Mich., will open bids May 7 for a pumping plant for the new lock at St. Mary's Falls Canal, Sault Ste. Marie.

The supervising architect, Treasury Department, Washington, will open bids May 6 for an oil-burning plant for heating boilers in the United States post office, Stockton, Cal.

The supervising architect, Treasury Department, Washington, opened bids March 15 for two new engines and generators for the United States post office, Cincinnati, Ohio, as follows: Ridgeway Dynamo & Engine Company, Ridgeway, Pa., \$10,621; American Engine Company, Washington, D. C., \$10,950; Harrisburg Foundry & Machine Works, Harrisburg, Pa., \$12,994.

The Bureau of Supplies and Accounts, Navy Department, Washington, opened bids March 19 for material and supplies for the Navy Yards as follows:

Schedule 4361, class 11, one standard four-motor electric traveling crane—Bidder 17, Case Crane Company, Columbus, Ohio, \$8,595; 19, Cleveland Crane Engineering Company, Wickliffe, Ohio, \$8,945; 44, Manning, Maxwell & Moore, New York, \$7,776 and \$8,638; 47, Moran Engineering Company, Alliance, Ohio, \$9,935; 50, Northern Engineering Works, Detroit, Mich., \$10,140; 52, Niles-Bement-Pond Company, New York, \$8,980; 60, Toledo Bridge & Crane Company, Toledo, Ohio, \$9,200; 72, Whiting Foundry Equipment Company, Harvey, Ill., \$8,900; 77, Alliance Machine Company, Alliance, Ohio, \$10,900.

Class 12, one No. 3 Newton new design bar cold saw cutting-off machine—Bidder 44, Manning, Maxwell & Moore, New York, \$1,290; 49, Newton Machine Tool Works, Philadelphia, Pa., \$1,230; 52, Niles-Bement-Pond Company, New York, \$1,063, \$1,251 and \$1,230; 54, The Q. M. S. Company, Plainfield, N. J., \$1,383; 58, Tindell-Morris Company, Eddystone, Pa., \$1,295; 67, Vandyck-Churchill Company, New York, \$1,840.

Class 13, one No. 2 Newton new design bar cold saw cutting-off machine—Bidder 44, Manning, Maxwell & Moore, New York, \$1,090; 49, Newton Machine Tool Works, Philadelphia, Pa., \$907 and \$1,061; 52, Niles-Bement-Pond Company, New York, \$1,113, \$1,054 and \$886; 54, The Q. M. S. Company, Plainfield, N. J., \$1,089; 58, Tindell-Morris Company, Eddystone, Pa., \$1,095; 67, Vandyck-Churchill Company, New York, \$1,560.

Class 14, one steam hydraulic or pure hydraulic forging press—Bidder 7, Bethlehem Steel Company, South Bethlehem, Pa., \$14,600, \$15,400 and \$21,200; 44, Manning, Maxwell & Moore, New York, \$13,000 and \$33,122; 23, Camden Iron Works, Camden, N. J., \$16,500; 46, Mesta Machine Company, Pittsburgh, Pa., \$11,900; 70, William H. Wood, Washington, D. C., \$15,550; 74, William Tod Company, Youngstown, Ohio, \$25,500, \$18,800 and \$30,150; 80, United Engineering & Foundry Company, Pittsburgh, Pa., \$10,725.

Schedule 4,362, class 21, one standard sash door and blind mortising machine—Bidder 3, American Wood Working Machinery Company, Rochester, N. Y., \$509 and \$622; 25, J. A. Fay & Egan Company, Cincinnati, Ohio, \$510; 30, Greenlee Bros., Rockford, Ill., \$505.50 and \$547; 44, Manning, Maxwell & Moore, New York, \$524.

Class 22, one electric welder—Bidder 48, National Electrical Supply Company, Washington, D. C., \$675, \$690, \$700, \$775 and \$800; 57, W. E. Shipley Machinery Company, Philadelphia, Pa., \$925.

Class 23, one automatic horizontal hollow chisel mortiser—Bidder 3, American Wood Working Machinery Company, Rochester, N. Y., \$410; Bentel & Margendant, Hamilton, Ohio, \$366; 25, J. A. Fay & Egan Company, Cincinnati, Ohio, \$400; 30, Greenlee Bros., Rockford, Ill., \$421.90; 44, Manning, Maxwell & Moore, New York, \$422.

Trade Publications

Jig Saw Machine.—L. F. Grammes & Sons, Allentown, Pa. Folder. Relates to a jig saw machine for the wood worker, engraver, printer, die maker and pattern shop. The special feature of the machine in the last field is that it will cut pattern metal which cannot be done with the ordinary band saw. The machine is described at some length and the text is supplemented by a half-tone engraving.

Ventilating Sets.—B. F. Sturtevant Company, Hyde Park, Mass. Mailing card. Devoted to a line of ready-to-run ventilating sets which are built in five different sizes and are ready for operation by simply attaching a flexible cord to the nearest light socket. These fans range in capacity from 35 to 1250 cu. ft. per minute and can be used for drying, cooling, ventilating, furnishing draft for furnaces and many other applications. An illustration of the five sizes is given.

Punches, Shears and Bending Rolls.—Slater, Marsden & Whittemore Company, Beloit, Wis. Catalogue No. 7. Size, 6 x 9 in.; pages, 32. Covers a complete line of punches, shears, bending rolls and woodworking machinery, among these being the combination punch and shear which was illustrated in *The Iron Age*, December 29, 1910. In describing the tools the general plan is to devote one page to each with an engraving at the top and a brief specification table at the bottom.

Mechanical Draft Fans.—B. F. Sturtevant Company, Hyde Park, Mass. Mailing card. Concerned with a line of mechanical draft fans which are said to be about 75 per cent. more efficient than the chimney draft and keep the steam production absolutely constant.

Sifting Machines.—Hanna Engineering Works, 2059 Elston avenue, Chicago, Ill. Catalogue No. 1. Contains illustrations and descriptive matter of the riddles and screen shakers built by this company. These are designed for hand use and also for operation by either compressed air or electricity. The various types are illustrated with text descriptions on the facing pages. The various parts of these devices are also shown disassembled into their component parts. Among the devices shown is an electrical riddle oscillator which was illustrated in *The Iron Age*, September 29, 1911. A partial list of users completes the catalogue.

Triplex Plunger Pumps.—Goulds Mfg. Company, Seneca Falls, N. Y. Bulletin No. 101. Refers to a line of single-acting triplex plunger pumps which will deliver from 2 to 350 gal. per minute against a maximum pressure of 150 lb. An illustrated description of these pumps appeared in *The Iron Age*, September 7, 1911. The various parts of the pumps are described and there are a number of engravings to supplement the text descriptions. Different types of pumps are shown and tables of specifications are given on the pages facing the illustrations.

Automatic Screw Drivers.—Reynolds Pattern & Machine Company, 101 Third avenue, Moline, Ill. Pamphlet. Lists the various styles of screw drivers which this company builds for handling either wood or machine screws. Five types in all are made for handling different sizes of screws and one of the machines is of the radial type, which enables it to be employed for work which is either too heavy or bulky to be handled under a machine having a fixed spindle.

Vacuum Condensers.—Wheeler Condenser & Engineering Company, Carteret, N. J. Bulletin No. 107. Is devoted to a discussion of high vacuum jet condensers, a large portion being given over to the rectangular jet condenser of this company. This condenser is constructed on the counter current principle, the arrangement of water trays, baffles, air outlet, exhaust steam inlet, etc., being such that the large volume of low pressure steam exhausted from a turbine is efficiently handled with the minimum consumption of water and of power on the part of the tail pump.

Engines and Boilers.—James Leffel & Co., Springfield, O. Booklet No. 74. Covers the entire line of engines and boilers built by this firm. The engines are of two types, the throttling and the automatic cut-off, the latter being the special one. Both types of engines together with the different styles of boilers are illustrated and a brief specification table of each is given on the page opposite the engraving.

Feed Water Heater.—Harrison Safety Boiler Works, North Philadelphia Station, Philadelphia, Pa. Catalogue. Size, 6 x 9 in.; pages, 144. The catalogue describes the various appliances manufactured by this firm for use in steam power plants. These are the Cochrane open feed water heater, steam stack and cut-out valve heaters and receivers, multiple-unit heater arrangements, Sorce-Cochrane hot process softening systems, combined feed water heaters and meters, steam and oil separators and a multi-port safety exhaust outlet valve. The book contains engravings illustrating the applications of these appliances in steam plants of various kinds as a supplement of the text description. An illustrated description of the last of these appeared in *The Iron Age*, November 16, 1911.

Alloys.—Phosphor Bronze Smelting Company, 2200 Washington avenue, Philadelphia, Pa. Price list No. 26. Concerned with the Elephant brand of phosphor bronze and other alloys. The various grades in which this metal can be furnished are given and this is followed by lists of cast and drawn rods, wire, wire rope and sheets and plates all made from this metal. Tables showing the

differences between the various wire gauges and the weights of phosphor bronze wire and sheets according to the different gauges complete the price list.

Air Compressors.—Ingersoll-Rand Company, 11 Broadway, New York City. Form No. 3211. Describes the Imperial type X duplex steam-driven air compressor and shows several views of the machine in section. The special features of these machines are a massive well braced structure, ample bearing surfaces, mechanically actuated air intake valve with large direct passages and cushioned discharge valves. Tables of sizes and capacities are included.

Elevator Guide Lubrication.—Peterson Engineering Company, 50 Church street, New York City. Bulletin No. 56. Describes and illustrates the Economy elevator guide lubricator for which the special advantages of a better application of the lubricant, safety to employees, a decrease in the amount of lubricant used, a saving in the amount of power required and a decreased fire hazard are claimed. After a discussion of necessity for lubricating elevator guides and the best lubricant to use, the design and operation of this lubricator are taken up, the text being supplemented by numerous illustrations. A partial list of the buildings in which this device is in operation completes the bulletin.

Revolution Indicator and Recorder.—Brown Instrument Company, Philadelphia, Pa. Catalogue No. 4. Illustrates the Brown revolution indicator and recorder which is a device for indicating or recording the revolutions of engines and shafts. This device is said to be the only speed recorder manufactured in which the friction of rotating balls or vanes is entirely done away with, the action of the instrument being based on the principle of centrifugal force. In this instrument a body of mercury contained in a central chamber is thrown out into revolving arms in an amount proportional to the speed at which the instrument is driven and the movement of the mercury is transferred by a pen to a circular chart.

Motors, Generators and Transformers.—Allis-Chalmers Company, Milwaukee, Wis. Five bulletins. The first, No. 1074, superseding No. 1046, relates to the type H and HI direct-current motors and generators which are self-contained belted or direct coupled units. In No. 1077 which supersedes No. 1061 illustrations and descriptive matter explain the construction of a line of lighting transformers designed for operation at frequencies of 60 and 25 cycles although if desired these figures can be varied to 50 and 140 and 25 and 60 respectively. No. 1078, superseding No. 1038, deals with a line of alternating-current generators which can be wound for voltages ranging from 240 to 13,200. No. 1082, superseding No. 1059, pertains to the type I and IW engine-driven direct-current generators which are supplied in either the two or the three wire type. The fifth and last bulletin, No. 1083, describes and illustrates the type K direct-current motors and generators which are especially designed for driving machinery through gearing or a direct connection. Numerous halftones showing applications of these motors to the driving of different machine tools are included.

Power Transmission Machinery.—Jeffrey Mfg. Company, Columbus, Ohio. Catalogue No. 50. Size, 6 x 9 in.; pages, 142. Is a very complete catalogue of power transmission machinery and lists the dimensions and sizes of the various appliances made by this company. The iron and wood split pulleys of this company are featured and in connection with the latter information on rope drives is given. Descriptive matter on the horse-power of steel shafting, standard methods of key seating, and sizes and dimensions of couplings, hangers, pillow blocks, countershafts, belt tighteners, clutches and quills is included, as well as data on the horsepower transmitted by belts and the method of calculating bending and torsional moments for shafting. To keep the book within a reasonable size, the information has been condensed as much as possible without interfering with its completeness.

Steel Lockers.—S. Keighley Metal Ceiling & Mfg. Company, Pittsburgh, Pa. Folder. Illustrates the Phoenix steel lockers made by this company. These are furnished in single and double tiers. Dimensions are shown. A list of sizes carried in stock for prompt shipment is also given.

Pumping Machinery.—Weinman Pump Mfg. Company, Columbus, Ohio. Bulletin No. 52. Calls attention to a line of high grade pumping machinery for all purposes which this company builds. These pumps are available for boiler feed service, tank and vacuum work and also deep well pumping. There is very little text in the bulletin, almost all the pages containing halftone reproductions of the different types of pumps with their sizes and uses.

Air Compressors.—American Air Compressor Works, 26 Cortlandt street, New York City. Catalogue No. 19. Gives general description and specifications for the American Fairhurst air compressors which are built in both single and two stage types for belt or direct connected drives. The various types of machines are illustrated on the left hand pages, while brief specification tables occupy the facing ones. Mention is also made of a dry vacuum pump and an air lift pumping system.

Grinders.—Challenge Machine Company, Inc., 5116 Springfield avenue, Philadelphia, Pa. Folder. Calls attention to the various types of combination grinder which this company builds. An illustrated description of this grinder appeared in *The Iron Age*, July 27, 1911.